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SKETCHES ON GLASS BATCHING PLANT DESIGN AND OPERATIONS

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Foreword

The author does not wish to pose as an expert or an authority on glass plant batching or operation. This presentation is being made primarily upon the assumption that there may be at least one idea, some data or material, that will be helpful to someone who contemplates the construction of a new batching system or the remodeling of an old one.

The cooperation of the management of the Bartlett-Collins Glass Company and the Liberty Glass Company of Sapulpa, Oklahoma, the Radiant Glass Company, and the Harding Glass Company of Fort Smith, Arkansas, and others in the assembling of material for this presentation is gratefully acknowledged.

Introduction

Once upon a time, not so long ago, we experienced the need for a new batching system and built one. Experiencing the need was a long and painful thing. Some of the painful symptoms were (1) Unloading material by wheelbarrow to partitioned bins was slow, expensive, hazardous (dust, etc.), and wasteful. (2) Assembling materials with shovel and wheelbarrow and weighing by put-and-take methods was slow, dusty, inaccurate, and very risky. (3) Mixing with antiquated mixers too small in capacity, using skip hoist for charging the mixers was also slow, dusty, required extra manpower, resulted in irregular and oftentimes poor mixes. (4) Control of the finished batch was practically impossible, with the antiquated equipment and methods and the numerous personnel. (5) Other symptoms too numerous to mention, including the excessive supervision required.

But with all the expensive and disconcerting pains, we did not surrender the operation until the demand for batch was too great for the old system to supply without danger of furnace shutdowns. Then we began trying to justify a new batching system in terms that would make sense to the general management of our company. And, believe it or not, this was not too difficult an accomplishment.

Presented before the Thirteenth Conference on Glass Problems, Ohio State University, Columbus, Ohio.

Justifying A New Batch System

Two important questions were posed: (1) Do we need a new batching system? The answer—yes.

(2) "Why?" Boiling it down some, we echo the reasons given by the operators of plants B, C, D, and E when they said that (a) the old systems were inadequate in their ability to produce the quantity and quality of batch required; (b) the labor cost for unloading material and mixing was out of line; (c) the storage capacity for raw materials was not adequate; (d) the quality of ware suffered because of the shortcomings of the batching system.

Can these difficulties be remedied by a new batching system? The answer that we have from eleven companies is that they were remedied when they built their new batching systems.

It is not difficult to reduce the cost per ton for unloading, mixing, and delivering batch to the furnaces by 50 per cent when you replace most of the old style batching systems with new and modern ones. For example, one concern that was paying about $1.10 per ton labor cost for mixing in the old batching plant, now has a cost of about 50¢ per ton in the new batching plant. If this concern averages mixing 100 tons per day seven days per week, they will save about $22,000 annually on labor alone, which is probably only a portion of the savings to be made on quantity and quality of ware produced because of the reduction of the human element and the improvement of batching facilities. Not to mention the reduction in waste, etc.

By taking advantage of height, the space required for a silo type batching plant usually requires much less ground space than the old style open bin systems, thereby conserving the valuable ground space in the critical zone for other operations.

Planning A New Batching Plant

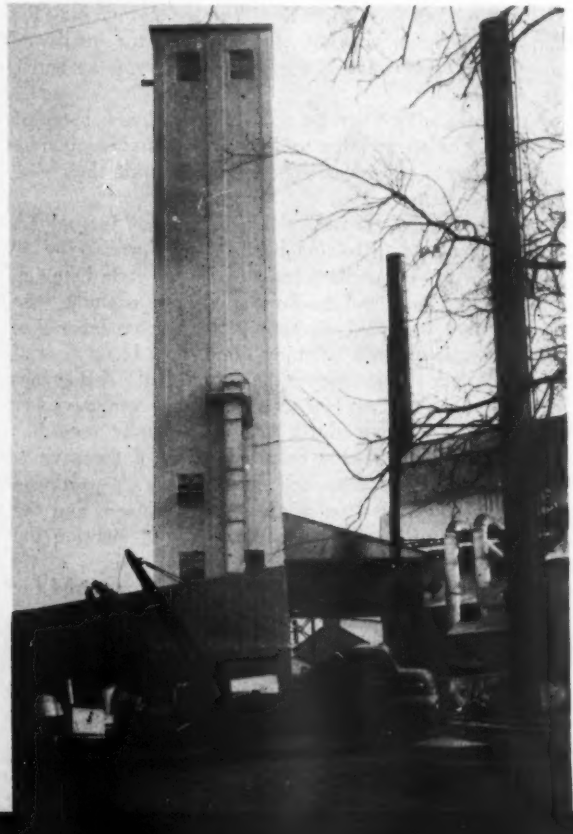
There are several considerations to be made here, some of which are: (1) Meeting your particular requirements—present and future. This usually has to be done on the basis of your peculiar situation: (a) taking into consideration the physical layout of your plant; (b) rail and trucking facilities; (c) amount of batch used at present and possible future demand; (d) storage requirements based on availability of raw materials; (e) labor and other savings that can be made with a particular system may be indications whether you wish to go automatic, semi-automatic, hand control, etc. (2) in any event, the system should be designed to fit your particular situation. A batch system that works almost perfectly for one plant may be of very little use to another plant. For example, we know of one concern—that we will call plant "A"—whose system consists of a row of open top concrete partitioned storage bins and a row of wood partitioned closed top storage bins, where unloading is done by shovel and wheelbarrow.

Assembling is done with shovel and wheelbarrow and weighing on a (old-time) single beam platform scale. The mixing is done with a 1913 Model Smith Tilt Mixer and the finished batch is dumped from the mixer to the concrete floor and conveyed from the batch room to the furnace by wheelbarrow and the furnace is charged with a hand shovel. Nevertheless, this system is adequate to meet the needs of this particular plant, with a few refinements that could be made in the present system.

Mixing but 8 or 10 tons per day at about $1.35 per ton labor cost, even if all the labor were saved, would amount to only about $3,000.00 per year, which would make it hard to justify even a $100,000.00 batching plant.

Plant "B" on the other hand was justified in erecting a square reinforced concrete tower by slipform method of

Fig. 1. Outside elevation of Plant B.



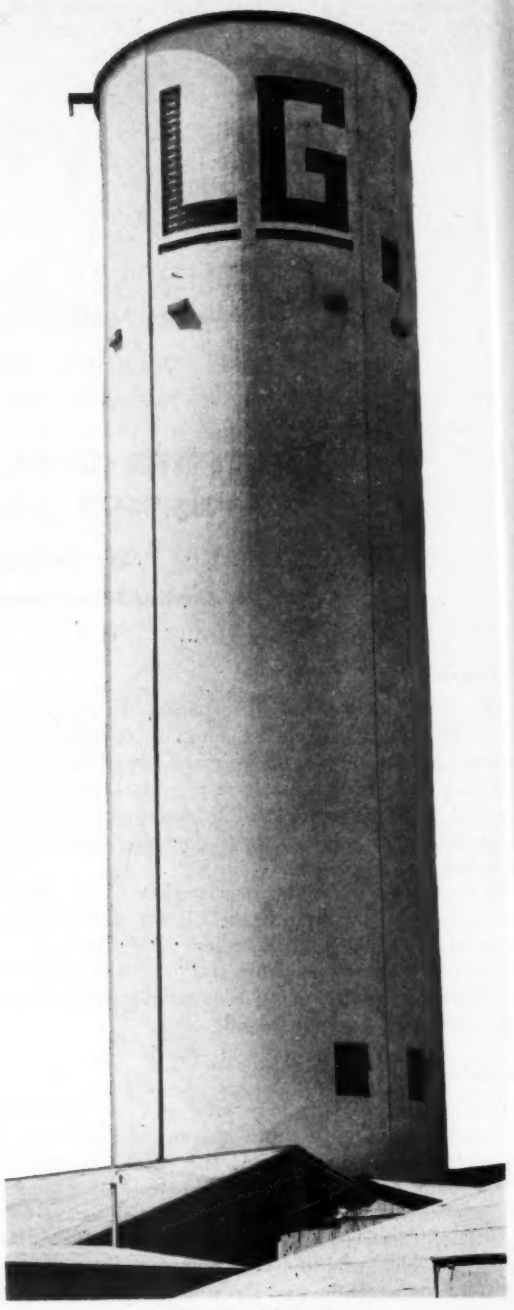


Fig. 2. Plant C.

construction dividing the interior into cells forming about nine bins. An undertrack hopper, with a conveyor belt running to elevator boot, provides for unloading hopper bottom cars. A car door power shovel is used to dump materials from the car into the hopper. A bucket elevator is used to convey materials from hopper to a turnhead selector spout in the head house.

Materials are fed from the bin bottoms by gravity to one dial type scale. Bin gates are operated by hand and each material is dumped directly into the mixer before the next one is weighed. Small ingredients are weighed on bench scales and dumped into the mixer through a slide chute. No interlocking system is used and the total

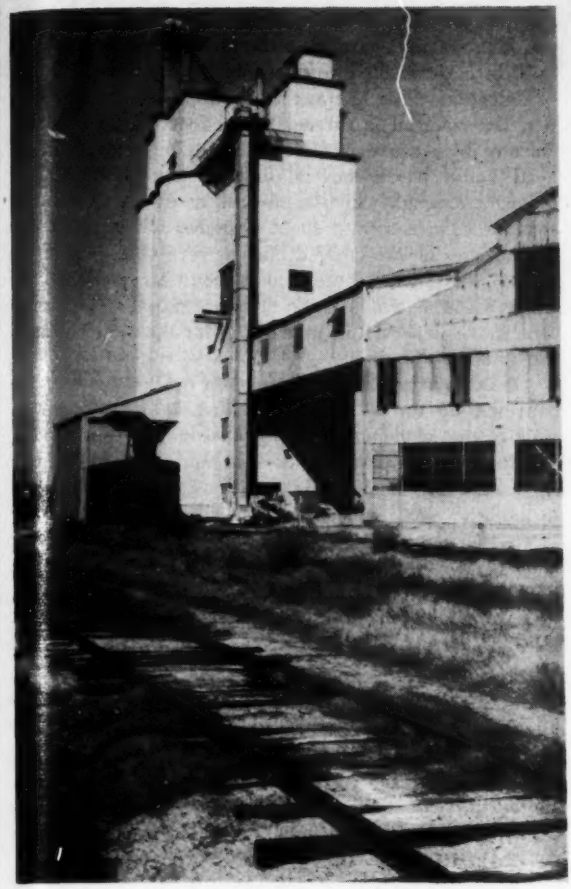


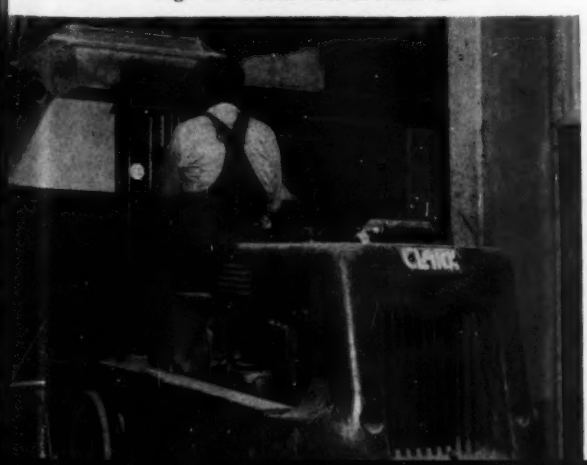
Fig. 3. Plant D.

batch weight is not check-weighed before or after mixing. The mixed batch is dumped into cans mounted on monorail and travel directly over the feeder hopper at the furnaces. A freight elevator and manlift are included in the plant. No dust collecting system is used as dust is not a problem at present. Open surge bins are provided at the ground floor for carrying extra stocks of bulk material, sand, soda, etc., adjacent to the materials elevator.

Facilities for washing cullet are provided in the plant. Cullet is mixed with the batch.

This batching system has met the needs of this plant to their satisfaction. It has reduced the batching cost enough to fully justify it and improved the quantity and quality of ware noticeably.

Fig. 4. Batch cans in Plant C.



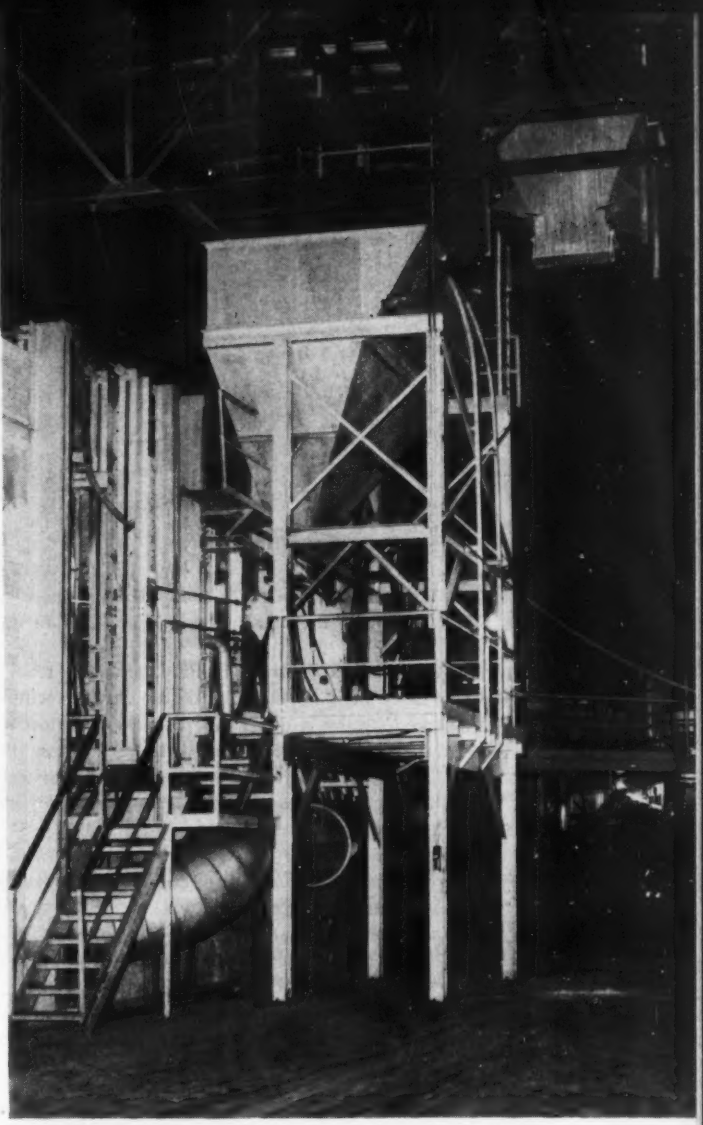


Fig. 5. Charging from batch cans in Plant C.

Plant "C" had a different problem than "A" or "B" and designed their batching plant accordingly. They chose a single round monolithic structure, 35′ diameter and 150′ high with a square cell in the center with partitions leading from it to the outside round portion, thereby forming nine storage bins for raw materials.

Materials are received and unloaded into an undertrack hopper and flow from it to the boot of the materials elevator by *gravity*. A car door power shovel is used to unload box cars into the hopper. A turn head distributor spout in the head house delivers materials to the various bins.

Vibrating feeds are used to feed the materials from the bin bottoms to two scales. A push button for each material is located on the scale cabinet and materials weighed by pushing each button in order. Materials are dumped from scales to a Smith Tilt Mixer below by a hand lever on the scale floor. The mixer is dumped by a wheel located on the scale floor and connected by a chain to the mixer tilt mechanism.

Because of the difference in elevation of furnaces and the arrangement of factory buildings, this company elected to use batch cans of about 5000 pound capacity

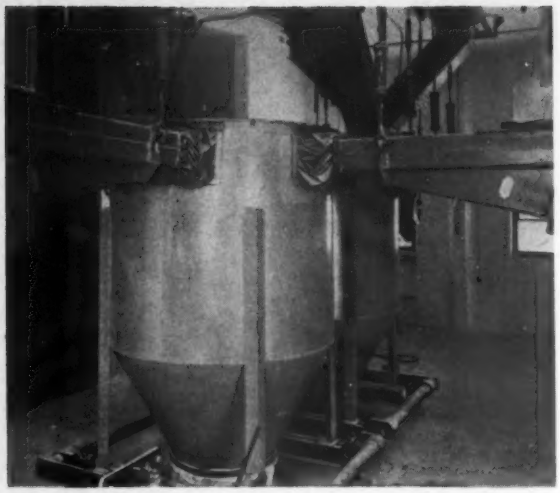


Fig. 6. Vibrating feeders feeding the scales in Plant C.

for transporting the batch to the furnaces and fork trucks are used to move them to the base of the furnace where they are picked up by a cable and lifted to the top of the feeder and dumped through a swinging gate on the bottom of the buckets. This system has worked so well that they have not considered changing. The supply of mixed batch is stored in these cans.

Small ingredients are weighed on bench scales and the various batches placed in different colored buckets and taken on skids to the scale floor where they are charged into the mixer through a chute. These people are satisfied with their plant because it is doing a good job economically for them.

Plant "D" had the unique privilege of planning the batch system in the original layout of the plant, although it was not built until after the plant was in operation. The plan of this plant shows four round bins, two at each end of a rectangle parallel to the railroad spur, with bins built in between them to form nine storage bins.

Unloading under a track shed into an undertrack hopper, the material is carried to the foot of the materials elevator by a conveyor belt. The distributor spout in the head house has a vertical hollow stem about 10″ in diameter through which sand passes. At the top of this stem or axle, a second spout branches off at about 45° and reaches all the other 8 bins by revolving around the stem. The bottom of the second spout is supported by a single wheel on which it travels between bins. A butterfly type valve deflects the material from the center bin to the others.

An outside crusher and elevator delivers cullet to a conveyor on top of the silos taking cullet through the wall of the head house to the cullet storage bin or to a vibrating feeder going to an alternate bin. A surplus of certain raw materials is carried in paper bags stored in the head house and on the scale floor.

The batch is weighed, mixed, and dumped into cans on a monorail automatically by pressing one mix-button on the master panel board. The system is interlocked so that the cycle cannot be completed unless all materials are present and properly weighed. The total batch, plus the water added, is checked-weighed after it is dumped from the mixer. No men, as batch mixers, are used—the filler pushes the mix-button. A part time unloader and maintenance man is used.

Two bag-type dust collectors are used in this plant; one on the scale floor and the other upstairs. The cleanliness of the plant gives testimony to their value. The scale

(*Continued on page* 448)

Fig. 7. Plant E.

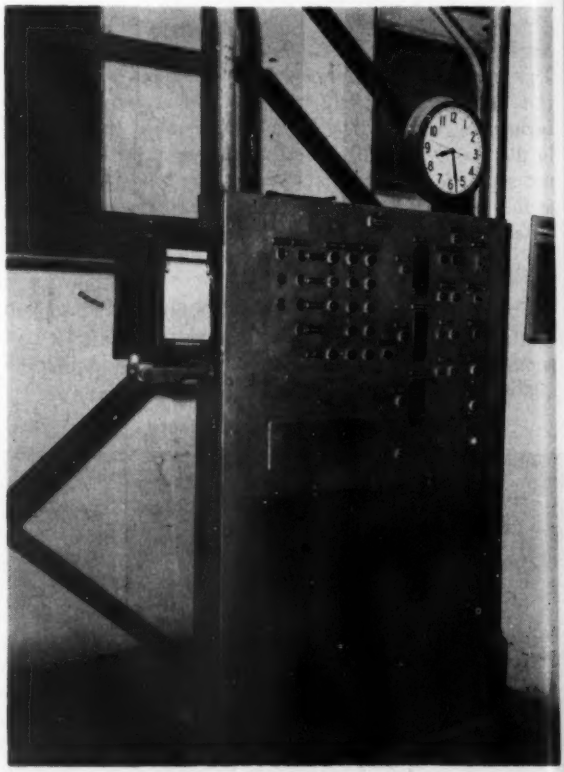


Fig. 8. Main control panel.

CANADIAN GLASS INDUSTRY SHOWS STEADY GROWTH

Canada's glass and glass products industry is continuing to grow, according to the latest annual survey of such operations just disclosed by the Canadian Government. This progress is coupled with the interest of United States firms in Canadian glass enterprise, with more Canadian plants coming into operation and a sharp increase in gross selling value of products at plants being recorded.

This survey reveals that once again the number of plants in this industry increased in 1951, rising to 113 plants as against 106 in 1950, 102 in 1949, and 95 in 1948. In addition, the number of employees engaged in such plants advanced to 6,527 in 1951, as against 6,444 in 1950, a gain of 1.3%, and their salaries and wages jumped up to $17,660,204, as against $15,632,414, up 13%, emphasizing a steady upswing in costs of labor. Cost of fuel and electricity at works also moved up to $3,542,633, as compared with $3,205,790, an increase of 10.5%, and cost of materials at plants rose to $20,551,774, as against $19,198,095, up 7.1%.

However, the gross selling value of the industry's products at plants increased to $54,913,292, as compared with $49,659,133, a gain of 10.6%, and the net value of production (that is, the gross value less cost of materials, fuel, and electricity) jumped up to $30,818,885, as against $27,255,248, a gain of 13.1%, considered an impressive improvement over the previous year's operations and continuing a trend which has been in evidence in this industry for the past couple of years.

The cutting, bevelling, and ornamental sections of this industry included all plants which were occupied in bevelling, cutting, or working glass to produce mirrors, bevelled or polished edge plate glass, laminated and other safety glass, cut glassware, chemical glassware, glass signs, show cases, prismatic glassware, etc. The number of plants operating in this group was 105 in 1951, distributed across Canada as follows: 58 in Ontario, 30 in Quebec, 10 in British Columbia, 4 in Manitoba, and one each in New Brunswick, Newfoundland, and Alberta. Production from these works was valued at $18,904,087 in 1951, a gain of 7.9% over the preceding year's output of $17,515,385.

Products made in the cut and bevelled glass division in 1951 included the following (figures in brackets being for previous year) indicating gains for all products except plate glass mirrors, decorated glassware, and receipts for repair work:

Bevelled or polished edge plate, $996,416 ($845,643); plate glass mirrors, $2,760,559 ($3,022,078); bevelled or polished edge sheet glass, $360,229 ($223,175); sheet glass mirrors, $816,107 ($675,219); leaded glass including memorial windows, $236,376 ($202,487); cut glass (tumblers, bowls, etc.) and decorated glassware (including engraved, etched, sandblasted, applied color, etc.) $1,175,562 ($1,201,033); druggists', physicians', and laboratory glassware, $549,148 ($407,104); receipts for repair work, $146,926 ($246,977); all other products, including laminated and safety glass, $11,862,764 ($10,691,669).

In the pressed, blown, and drawn glass division, production included bottles, sealers, ovenware, window glass, etc., totalling $36,009,205, as compared with previous year's $32,143,748.

Of materials used in manufacturing cut and bevelled glass products, $4,103,054 was for plate glass for bevelling, silvering, laminating, etc., as compared with $3,742,399 a year earlier and $1,529,873 for sheet glass for same purposes as against $1,348,606.

Imports of glass and glassware advanced sharply to $31,408,091 in 1951 as compared with $27,831,787 in 1950, including 69,454,426 sq. ft. of common and colorless window glass valued at $4,586,378 as compared with 68,526,066 sq. ft. at $4,461,379; $4,312,431 of glass demijohns, carboys, bottles, flasks, phials and jars, and balls not cut, $4,312,431, as against $3,538,526; plate glass, not bevelled, in sheets or panes, not exceeding 7 sq. ft. each, $2,624,716 as against $2,499,199; incandescent lamb bulbs and glass tubing for the manufacture of incandescent lamps, vials and ampuls, and glass tubing, n.o.p., in straight lengths of not less than 3 ft., $2,069,616 as against $2,245,723; plate glass not bevelled, in sheets or panes exceeding 7 sq. ft. each and not exceeding 25 sq. ft. each, n.o.p., $2,063,564 as against $1,528,984; plate glass n.o.p., $2,041,784 as against $1,548,303.

Exports of glass and glassware increased only to $970,031 as against $932,269, stressing that this trade is still limited for the Canadian industry, though progress is being made slowly.

As in most other industries, the glass and glass products industry found itself confronted with rising labor costs despite all efforts by the manufacturers to keep their costs of operation as low as possible in order not to be forced to boost prices and face a possible buyer's resistance movement from developing as occurred in some other Canadian industries in that year.

Employees increased in number to 6,527 in 1951, including 699 male workers and 345 female workers in supervisory and office work, and 4,696 male and 787 female in production work, while in 1950 of the 6,444 workers, supervisory and office work accounted for 726 male and 329 female, and production workers included 4,569 male and 820 female.

Earnings of such workers totalled $17,660,204 in 1951, including $3,454,318 for supervisory and office workers, and $14,205,886 for the production workers, as compared with a total of $15,632,414 earnings in 1950, including $2,960,797 for supervisory and office work, and $12,671,617 for production workers.

BALL BROTHERS NAMES TRAINING DIRECTOR

Fred M. Crandall, formerly of Owens-Corning Corporation, has been named Director of Training for Ball Brothers Company, filling a newly-created position on the Industrial Relations Division staff. The announcement of Mr. Crandall's appointment was made by Ralph C. Edgar, Vice President of Employee and Public Relations.

Mr. Crandall will be responsible for a program of job training, supervisory and executive training.

THE THIRD INTERNATIONAL CONGRESS ON GLASS

Atmosphere

In the atmosphere of traditional elegance and spirited vitality that characterizes modern Italy, the Third International Congress on Glass convened in Venice from June 29 to July 4 under the presidency of Prince Giovanni Ginori Conti. Seventeen years of major warfare and human cleavage have interceded since the Second Congress adjourned in London; and Dr. W. E. S. Turner, spiritus rector of the glass world, in the guise of a president of the International Glass Commission, selected Italy in the sentimental yet realistic symbolism of a second commencement exactly in the location where he had sponsored the First Congress in 1933.

More than one hundred sixty delegates, accompanied by a large number of dependents and coming from more than fifteen glass producing nations, gathered in Venice's noble Vendramin Calergi Palace after an inaugural ceremony in the new Procuracy that had been followed by the Mayor's Reception in the City Hall. Spiritual and material hospitality in rare quality was extended also at banquets given by city and industrial organizations. Glass craft at its best was exhibited to the congressists in the work shops of Murano, glass industry of a specific but modern type in the Vetrocoke factories of suburban Venice. Generous gifts of homage were received in plenty by all who attended and they must, in the aura of Murano, be of exquisite taste and execution as is only encountered there. In turn, Mrs. W. E. S. Turner presented Prince Conti with a goblet of her own creation. Tokens of the manifold beauty that traverses and encircles Venice were unfolded as the ancient Cathedral of Torcello was visited, and the last day of the Convention week was spent under the towering Dolomites of Cortina D'Ampezzo. Italy was proud to announce on this occasion her plans for a Glass Institute.

Physiochemical group has tense moment: Peyches (France) is the speaker. Earphones render statements in English, German, and Italian.

Program

Technical sessions were divided in four groups (physical chemistry, engineering, art, and history) that took place simultaneously during two days. All transactions were translated into the three others of four Congress languages (English, Italian, French, German) by capable and personable interpreters and diffused by earphone systems. The Congress presidium and its staff did a masterpiece considering the exceedingly small period of time at its disposal. Credit goes to a large number of functionaries and organizations inspired by the Prince, by Gr. Uff. Dr. Michelangelo Pasquato, head of the glass manufacturers association, and Dr. Porru, its secretary. Newspaper and pictorial coverage was most extensive and introspective and almost all of the few illustrations are taken from the huge official record by Feruzzi.

Open Session

The technical sessions proper were preceded by a general open session of one day which was introduced by Dr. Pasquato's extensive and lucid survey of the history of Murano glass. Dr. Turner presented pictures and data on glass societies — his own (1916) preceding ours (1918) in a series of about a dozen—and institutions of which we remember about three dozen. D'Argenlieu (St. Gobain, France) pleaded for a non-nationalistic, conscious all-European architecture that had place for the wide and diversified use of glass. Professor F. Roma, University of Bologna, revealed the spectacular inroad of natural gas into the Italian industry which is of particular interest to Americans. In some large areas which happen to be both active in glass and rich in natural gas as much as 30% of the energy used for melting glass has been so converted; and Murano is all set for a special pipeline and distributory installations. Dr. M. Czerny's (Frankfurt) critical talk on radiation phenomena in glass tanks was most judiciously adapted to the requirements of a general meeting and pleasantly presented. Abroad as well as here we should be increasingly concerned with the fact that there is much material that can be better read than heard and with the goal to reconvert, by the

proper selection of natural speakers, meetings in suitable places of discussion should be held. Czerny treated with modesty the contribution of the physicist, to-date, to the analysis of radiation in combination with conductivity. Two motion picture films, one documentary on bulb manufacture and one cartoon on glass structure, the latter designed by the speculative mind of I. Peychès (France), provided visual phases of instruction.

Ekaterina Boyadjieva, Venezia, June 30, 1953

Dr. W. E. S. Turner

Group I — Chemical and Physical Properties

Nineteen papers were submitted, and most of them presented in the Chemical and Physical Properties Group under the joint chairmanships of N. J. Kreidl (U.S.A.), B. Long (France), J. M. Stevels (Holland), and A. Dietzel (Germany). Our photographer obtained an excellent representation of the intensity of the deliberations.

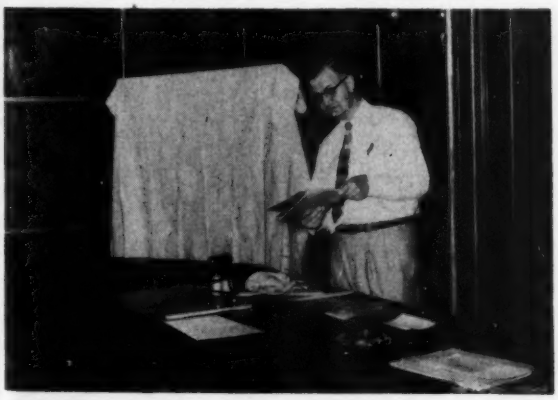
I. Peyches (France) had to combat the brittle subject of polarization of refractory oxides submerged in molten glass simultaneously with a short circuit, interfering with projection, and a blackboard that spun away from his improvisations. Thunderous applause rewarded his presence of mind, skill of presentation, and scholarship. The electromotoric force series of the most important elements was established (+ Si, Al, Zr, Pt, Ca, Mg —) with reference to Pt and correlated with the network forming or modifying character in glass and represents additional information on structure. At the same time practical conclusions on the function of refractories and the disturbance in the presence of more than one refractory were gained.

R. W. Douglas (General Electric, England) introduced his scholarly study on the change of physical properties with time by an elaborately prepared elementary introduction of the statistical interpretation of entropy that was heartily appreciated by the crowd of technologists. Under certain restraining assumptions the ways in which oxygens can be arranged between silicons that happen to be too far apart can be quantitatively correlated to the irregularities of e.g. viscosity, as they contribute an accessory logarithmic relation of distance, temperature, and two energy terms.

Our delegate, Dr. H. Holscher (Owens-Illinois, Toledo), presented a paper, by his collaborators, C. L. Babcock and S. Barber together with K. Fajans (University of Michigan, Ann Arbor) on coexisting structures in silica. In spite of the different fundamental approach, this phenomenon appears in beautiful proximity to the preceding work of Douglas. The important result of all experimental evidence is that a large volume low temperature structure of silica converts rapidly and reversibly to a smaller volume higher temperature structure at moderate temperatures. The phenomenon is believed basic to property changes in commercial glasses. Dr. Holscher excellently presented the case that derives from a difficult phase of research other than his own.

The uncommon glasses formed near the optimum composition 55% calcium nitrate—45% potassium nitrate were investigated by A. Dietzel (Silicate Institute, Wurzburg, Germany) and traced to the group $[Ca(NO_3)_4]$, favored only by weak positive environments such a K^+, as the glass forming element. He also presented a study on the surface tension of glass in which a lower factor was found for SO_3 than for CrO_3 and V_2O_5 which strongly lower the surface tension. Our delegate, Dr. D. Stuart (Cornell), presented, upon special invitation of the Congress, the well-founded general theories he developed with O. Anderson (Bell Telephone) before the Chemical Society Symposium in Los Angeles, on kinetic theories of the glassy state and which we reported extensively at that time. In conclusion, he stated that whereas ionic conductivity theories which are mutually equivalent are reasonably successful, those on fracture are quite

Holscher (USA) presents Fajans-Barber paper.



Committee group: Kreidl (USA), Allolio (Germany), Stevels (Holland), and Vandecapelle (Belgium).

Stuart (USA), Mrs. Douglas (England), Anderson (USA), Douglas (England), and Mrs. and Dr. Kreidl (USA).

different and cannot be distinguished by the meager experimental evidence available.

N. Kreidl (Bausch and Lomb, Rochester, N. Y.), the President of our delegation, reviewed the most recent experimentation on the interaction of glass with high energy radiation. Supplementing data previously reported in THE GLASS INDUSTRY from his lecture in Los Angeles, the mechanism of cerium preventing discoloration of glass was demonstrated in model phosphate glasses where transparency in the u.v. revealed significant band changes that are similar to oxidation in the range in which F center formation by x-rays was prevented. He also placed, in the name of the absent author, before this international audience, H. Lillie's re-evaluation of glass viscosities at the annealing and strain points. The recommendation that $10^{13.00}$ and $10^{14.50}$ determined at the rate of 4°C. per minute, with supplementary specifications, should define annealing and strain points was received favorably after a long discussion in which Dr. Holscher explained the developments before our Society.

For similar reasons, much attention was given by this audience to the methods of physical definition used in Europe, as exemplified by P. Migeotte's (Belgium) papers on the determination of expansion by the chevenard, and (with H. Vandecapelle) on the flow and relaxation at 500°C. under variable load of a glass in various stages of stabilization, as well as by R. W. Douglas and B. P. Dudding's (General Electric, England) study on errors in the measurement of viscosity of glass, this latter presented on behalf of the British Society's Physical Properties Committee.

Italian science was well represented in this session by competent discussion of the diversified problem of chemical durability (G. Lupati, Cristalleria Murano), surface modifications in glass with particular reference to pharmaceutical uses; G. Bifani (Cristalleria Murano) chemical resistance of glass.

We should greatly profit, in America, by the occasional oral exchange of current concepts in annealing with those under discussion abroad. At the Penn State Symposium recently reviewed in this journal, reference was made to divergent views in France. Such a statement seems oversimplified to the listener of pertinent discussions in Venice where B. Daragan (French Glass Institute), "Contribution to the Establishment of Annealing Curves Based on the Structural State of Glass," appears to start from concepts well recognized here and to arrive at novel conclusions through well conducted experiments. It was found that glasses annealed from definite intermediate structural conditions transform much faster than would be expected from considerations merely based on the treatment of quenched glass, and much faster practical cycles of annealing were devised. P. Acloque and I. Peychès (St. Gobain, Paris) demonstrated their thermal treatment suppressing the anneal of plate glass which has been utilized in "temnization," the rendering suited to the cutting operation of crudely annealed sheet by playing a flame for $2 \pm \frac{1}{2}$ second to produce a short heat rise of only 100°C. in the very surface. The critical conditions were well illustrated in dynamic strain pictures.

Group II: Manufacture

This reviewer did not attend the judicial selection of engineering papers offered in the second group under the title, "Manufacture: Materials, Equipment, Methods." An attendance of over 50 through most of the time, testified to the reception of this array of practical discourses. This speaks for the unusual and liberal attitude of international glass engineers.

From what we hear from those who attended, tank design and heating problems as proposed by S. Kruszewski, (United Bottles, England), "Application of New Techniques in the Design of Furnaces," I. Sawai and Associates (Japan), "Studies on Glass Tanks," E. Brichard (Union de Verreries Mecaniques, Belgium), "New Melting Process in Which Flames Are Blown Through Molten Glass," W. Hampton (Chance Bros., England), "Assessment of Society of Glass Technology Tank Efficiency Formula," J. Partridge (GE England), "Slip Cast Tank Blocks," were in the foreground of interest.

In Kruszewski's presentation, transparent scale models were demonstrated that facilitate decisions on design. The Japanese study resulted in an exponential formula relating the working chamber glass level to the charge, time, two constants depending on viscosity, density, throat dimensions, and lengths of method and working chambers, and another constant dependent on initial conditions. Dr. Partridge's blocks are slip cast mullite and zirconia-mullite types of high corrosion resistance.

Equal attention was given temperature measurement. Dr. A. Kruithof (Philips, Holland) described ("Some Remarks on Measurement of Furnace Temperature by Thermocouples") a practical suction pyrometer for measuring hot gases.

The favorite subject of defects was represented by an "Account of Some Systematic Work to Establish the Origin of Black Specks," by F. Hartley and W. Merren, Pilkington Bros., England; and P. Angenot's (Glaver, France) "Technique for Sampling and Analyzing Inclusions," in which he was able to identify refractory stones in 50 mg. samples, and plane or curved layers only few tens of microns thick.

Analysis proper was the subject of Miss C. De Marchi's and G. Romangoli, Vetrocoke, Italy "Analytical Studies of Italian Sands." In this paper the process of solution of chromium spinel from a speck was demonstrated in a microsection; and a mineralogical method separating sand, by means of bromoform and by magnet, was described.

The description of new products was best represented by Dr. Spasciani (Manif. Isolatori Vetro Acqui, Italy), who described suspended electrical insulations of tempered glass; and that of new processes by the engineers of St. Gobain, Paris (J. Sejournet and I. Peyches) who introduced the audience to the extrusion of metals using "molten glass as a lubricant." Bars of 60 ft. length, weighing 200 lbs. extruded in 2-3 seconds involve melting of 100 grams glass for lubrication in a film of 20 microns.

Other papers were by P. Rossi, Vetrocoke, Italy, on "Natural Gas in Libbey-Owens Flat Glass Tanks," I. Marchan (Union de Verreries Mecaniques, Belgium), on "The Thermal Balance of Oil Fired 2000 t Window Glass Tanks," W. E. S. Turner, "Temperature Determinations in Different Tank Locations," W. Frank and J. Boow (England) on "Blowing Procedure and Bottle Wall Thickness."

R. Allolio (Germany), F. Borella (Italy), and I. Peyches (France) were in the Chair.

Group III: (Form, Design, Decoration) and IV (History) (By Ann Mari Holmberg)

Edward Hald (Orrefors, Sweden), the great artist creating since 1917 and exerting an equal skill in management between 1933 and 1945, introduced the sessions by a magnificent presentation that was of lasting effect on the artists as well as the glassmakers in the audience ("Experiences of an Artist in Industry"). He emphasized the necessity of collaboration between artist and management and delineated a clear course of action. A colored film illustrated the lecture.

The artist should not be engaged for short range purposes, or with the eye on an exhibition; rather, he should live in the factory and absorb its technique and economy. He ought to be free in his experimentation like the researcher, and he must remain close to the glassmaker until he can think as he does in terms of his material.

In a related vein, as the session continued under Hald's chairmanship, A. Copier, famous Leerdam's art director, systematically analyzed the indispensability of the artist in the industrial production of glassware.

E. Barovier (Italy) described the coloration of glass by heating with reagents below the melting temperature by placing coloring materials alone or with sand, lime, soda, zinc oxide between layers of hot glass.

Mrs. W. E. S. Turner, the Professor's wife, who teaches in the Art School of Edin, England, in her talk on the training of students as glass artists, demanded that future glass workers and designers should be able to learn in a factory. At the same time it must not be forgotten that learning and training cannot provide the native element in the artist.

Elisa Steenberg (Sweden) ("Swedish Glass, Design Problems in Past and Modern Periods") touched phases of development and trouble.

A. Mazzi (Soc. L. Fontana, Milano), speaking on form, design and decoration of flat glass in Italy, provided a general analysis of the theme of the session in relation to his particular industry, postulating at the end, among other things, contributions from school in formation of creators as well as directors, a national institute cooperating abroad and better patent rights for ornamental invention. Other papers were by A. Barovier (Milano), "Glass in Building," as well as in the historical session under Pasquato's chairmanship, by R. W. Smith, the president of the International Committee on Ancient Glass (U. S. A. Security Board, Coblentz, Germany), on the challenge of antique glass to the modern glass industry; Dr. W. E. S. Turner on the value of technical methods in the study of antique glasses; J. Bourquin (Switzerland) on P. L. Guinand, the inventor of optical glass processes in the 18th century; and G. Faiper-Feytmane (Belgium) on Roman and Merovingian glass in Belgium.

The sessions were concluded in assembly at which the American Delegation, through N. Kreidl, introduced a brief series of reports of group activities and expressions of thanks. He closed in expressing the expectation that the communication of glassmen might aid the purpose (which thought he believed Prince Conti, speaking Italian, had included in his opening remarks) for a free association of free men in the entire world.

N. J. KREIDL,
Bausch & Lomb Optical Co.

Prince Conti, Congress President, displays gift goblet, executed by Mrs. Turner, received from Dr. Turner. Dr. Dudding, (left) new Commission President (England), looks on.

CHAS. TAYLOR SALES REPRESENTATIVE DIES

Armin O. Schleiffarth, St. Louis representative for The Chas. Taylor Sons Company since 1940, died at his home on July 7.

Earlier in his career, Mr. Schleiffarth served as an engineer for the Laclede-Christy Fire Brick Company. The Chas. Taylor Company will now be represented by Donald K. Schleiffarth, son of A. O. Schleiffarth, who has been associated with his father for the last several years.

HOERNER APPOINTMENTS

R. N. Hoerner, President of The Hoerner Corporation, has announced the promotion of F. W. Thiem to the position of General Production Manager and B. L. Deiling as Superintendent of Maintenance, to succeed Mr. Thiem.

Bart Brown, former time-study engineer at Iowa Fiber Box Company, has been promoted to the position of Superintendent and Office Manager of the company's new division in Sioux Falls, South Dakota, which operation is expected to get underway some time this fall.

FLASK DESIGN PORTRAYS TEMPO OF EARLY NINETEENTH CENTURY

Art, history, and glassmaking techniques are combined uniquely in the current, special exhibition at The Corning Museum of Glass at Corning Glass Center.

The "American Historical Flasks" display is intended to stimulate not only the appreciation of early nineteenth century glass design and technical execution, but also to present an insight into the political, economic, and sociological tempo of the times. Carefully selected photographs and documents substantiate and develop the theme of the display.

The exhibit includes 320 representative flasks from the superb 2,000-piece collection of George S. McKearin, Hoosick Falls, N. Y., dean of American glass collectors and co-author of the two most definitive books on the subject. Miss Helen McKearin, his daughter, organized the Corning display and assembled the two-dimensional supplementary material. The exhibition is the first comprehensive showing of American historical flasks ever presented by a public institution.

Art historically, the molded design on the pocket-bottles are of considerable interest and in some instances are of real importance. The early busts of Washington, complete with Roman toga, exemplify the American classic revival movement of the 1820-30 period. The influence of the showman era with design of cartoons, ads, and posters depicting persons with big heads, little bodies, and a great deal of detail is certainly responsible for the 1859 Pike's Peak flasks.

American historical flasks were made to sell; the designs they bore were familiar and typical of the era. For more than 40 years they reflect, as truly as any other medium, the kind of representation Americans wanted and made.

For the person interested in glassmaking techniques, the display is of especial interest for its explanation of full-size mold blowing as used in this country shortly after the turn of the nineteenth century. It is believed that large-scale local production of uniform bottles became necessary during the War of 1812 when European supplies were cut off. Comparisons of free-blown, pattern-molded, and full-size-molded flasks introduce the exhibit.

Mr. Buechner holds an early American glass flask bearing the likeness of Jenny Lind, while Miss Eleanor Mertson, Museum assistant librarian, views one with the likeness of General George Washington. The pre-Civil War period history is told in the designs used to decorate many of these collector's items of a 125 years ago.

Thomas S. Buechner, Director of The Corning Museum of Glass, discusses the American glass flask exhibition with George S. McKearin, dean of American glass collectors, from whose collection of glass items the flasks were obtained, and Mr. McKearin's equally famous daughter, Helen McKearin. In the background may be seen some of the collector's items on display, together with political cartoons, portraits, and newspaper advertisements assembled to illustrate various phases of pre-Civil War American history.

The same patriotic, and monetary, enthusiasm for domestic enterprise which led to the expansion of the bottle industry also contributed to the development of flask decorations of historic importance. The young nation was beginning to savor its new-found independence and the reflection of this spirit is clearly evidenced in the flask designs.

Miss McKearin notes in the catalog which documents the exhibition: "The majority of flask designs are as American as apple pie. Those charted roughly fall into four principal groups: Masonic emblems and designs related to our economic life, portraits of national heroes and designs associated with them or their deeds, portraits of presidential candidates, and emblems and slogans of political campaigns."

The earliest standard decoration used on the pocket-bottle seems to have been Masonic emblems. Although Masonry declined in political influence early in the period, the order continued to command considerable social prestige and it is speculated that the discontinuance of whiskey flasks bearing the Masonic figures was caused partly by the spreading temperance movement.

The origin of American historical flasks has never been definitely attributed to any one man or place, but evidently Thomas W. Dyott, Philadelphia druggist, had an important part in developing the new industry. As early as 1812 he advertised flasks bearing the design of the "American Eagle, ship Franklin (the 74-gun frigate

(*Continued on page* 454)

PERMEABILITY OF FIREBRICK

Using a permeameter of improved design, the National Bureau of Standards has recently completed a study of the permeability to air of various firebricks and of refractory-clay pots used for melting glass. The permeameter provided an easy and accurate means of determining the relation between the pressure gradient across two opposite faces of a test specimen and the rate of air flow through the specimen. Bulk densities, moduli of elasticity, and porosities were determined in addition to flatwise, edgewise, and endwise permeabilities. The permeability of the glass melting pots was found to be a good criterion of their resistance to penetration by molten glass, and this was perhaps the most interesting finding from the standpoint of direct practical application. However, the firebricks were the principal focus of the study, which was conducted by G. B. Massengale, L. E. Mong, and R. A. Heindl of the NBS refractories laboratory.

Permeability is expressed in terms of the flow of air in cubic centimeters per second that will pass through two opposite faces of a 1-centimeter cube, when the pressure between the two faces of the specimen differs by one gram per square centimeter. Information on the significance of permeability of refractory materials has been rather limited, but its possible importance has not been overlooked. For instance, highly permeable refractory bricks have been selected for the construction of furnaces of improved efficiency. Also, it has been suggested that manufacturers of refractories might be able to control closely the uniformity of their products by maintaining uniform permeability. It has been suggested, too, that permeability may be important in determining the resistance of refractories to molten glass, alkali vapor, carbon monoxide, and molten slag, and in determining heat losses due to flow of hot gases through the walls of refractory installations. The NBS investigation was undertaken primarily to obtain more definite information about room-temperature permeabilities of firebricks manufactured in the United States.

The permeameter developed for the NBS study is a modification of a permeameter described by Ketchum, Westman, and Hursh, but has advantages not offered by those previously described in the literature. A specimen to be tested is placed in a "seal box" arranged to permit air under pressure to be applied to one face so

(*Continued on page* 452)

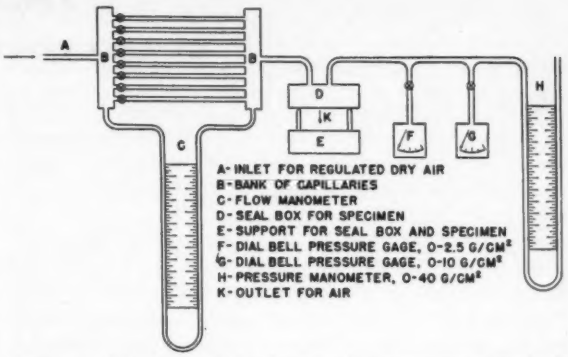
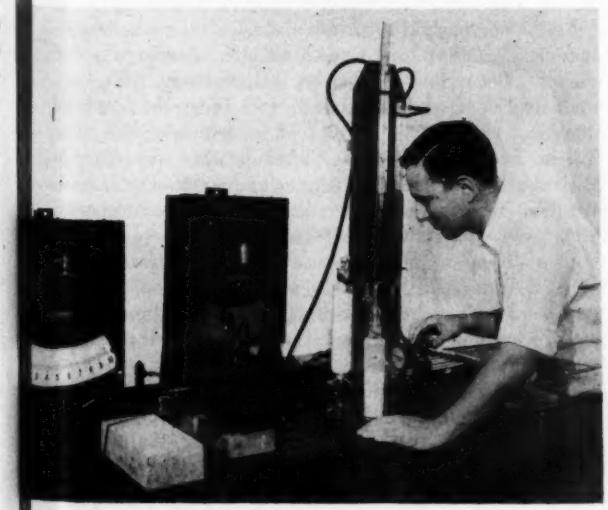


Figure 2. Diagram of the improved permeameter devised at the National Bureau of Standards for measuring the permeability of firebrick to air at room temperature.

For further technical details, see "Permeability and Some Other Properties of a Variety of Refractory Materials," by G. B. Massengale, R. A. Heindl, and L. E. Mong, J. Am. Ceram. Soc. July and August 1953.

Figure 1. Measuring permeability of a firebrick to air using an improved permeameter. The brick under test is in the flat rectangular black seal box (center foreground). Air under pressure enters the top of the seal box after passing through driers and a flow meter (right). From the top of the box the air flows through the brick from top to bottom, flowing out of the lower surface of the brick and out of the open bottom of the seal box at room pressure. A rubber inner tube arrangement fits snugly over the brick inside the seal box and is inflated with compressed air by means of the tube entering at the left of the box. The four vertical sides of the brick are thus sealed so that no air flows through them. Two pressure gages (rear left and center) and a pressure manometer (right rear) are connected to top of the seal box. These indicate pressure difference, over three ranges, between top and bottom of the specimen. Permeability is calculated from the pressure difference and the rate of air flow.



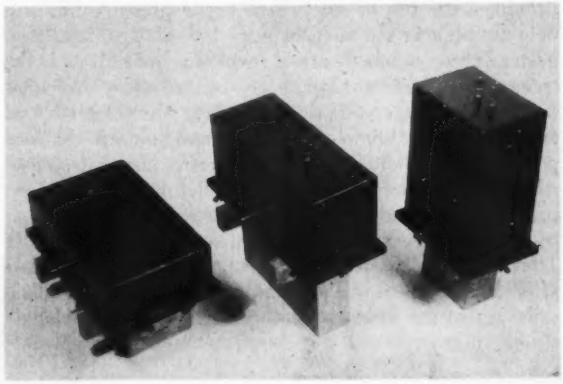


Figure 3. To measure flatwise, edgewise, and endwise permeabilities of firebrick, three seal boxes were required. In each case air under pressure enters the top of the box through one of the two fittings, passes through the brick from upper horizontal face to lower horizontal face, and flows out into the room through the open bottom of the box. Through a fitting on the side of each box, compressed air is supplied to the rubber inner tube arrangement that fits over the vertical faces of the brick. This tightly seals the vertical sides of the brick so that no air can flow through them. The second fitting on the top of each box is for connecting pressure gages to measure the difference in pressure between the top and bottom surfaces of the brick.

A CHEMIST LOOKS AT GLASS: 1902-1952

By ALEXANDER SILVERMAN*

After half-a-century in the field, the writer is tempted to present a comparative study of conditions encountered at the turn of the century, and later developments made in the applications of chemistry and related sciences to glass technology.

In 1902 there were, to the writer's recollection, only seven chemists in the entire glass industry of the United States of America. They were Frederick Gelstharp of the Pittsburgh Plate Glass Company, Robert Linton and Robert L. Frink of the American Window Glass Company, George Barton of Whiteall-Tatum Company, Henry Hess of Libbey Glass Company, Douglass Nash of Tiffany and Company, and the writer himself at Macbeth-Evans Glass Company. In addition to composition control for raw materials, fuel, furnace gases, and glass, these men experimented with the glass itself and with its treatment.

In the writer's own case, it was necessary not only to check the raw materials, but also the various glasses in the 48-pot factory where 24 pots were worked each day. There was a variety of glasses: soda-lime, lead-flint, heat-resisting, opal, gold-ruby, copper-ruby, copper-blue, cobalt-blue, chrome-green, carbon-amber, manganese-amethyst. To analyze each glass quickly enough for a daily pot-check was impossible, so a rapid method had to be devised. Finger proofs were taken, and weighed in air and in water. Ere long a definite specific gravity was established for each glass, and it was possible to detect errors promptly.

In addition to control work, experiments were conducted for the improvement of gold-ruby glass, and for the reproduction of alabaster glass, the art of whose making had been lost about 1880. In the experiments on alabaster glass, scientific principles were involved which were not understood until years later. An analysis of the old alabaster glass had revealed a high alumina content. No courses in glass technology were offered in American universities during the period 1897-1902 when the writer was a chemistry student, so he naturally introduced alumina into the trial batches as hydrated oxide, not thinking of feldspar, for the literature on glass was in German and was not yet available in our libraries. The alumina glass obtained had a horrible appearance. It looked like curdled milk. What to do next? Stirring seemed logical. Lack of knowledge of mechanical methods prompted the use of salt whose vapor pressure was sufficiently high in the melt to suggest stirring ability. Alabaster glass resulted after numerous trials, and the transmitted light was white instead of fiery like that produced by the opal glass of the day. Years later it was evident that salt dissolved in glass and ionized, the ions precipitating colloidal matter thus destroying opalescence. Also, later researchers revealed that aluminum could replace silicon in the glass lattice and that excessive alumina caused silica to separate in opal and alabaster glasses. The loss of alabaster effect about 1880 was explained after an historical search which revealed that LeBlanc soda ash in use prior to 1880 contained sodium chloride and sodium sulfate as impurities, while the newer Solvay soda was practically pure sodium carbonate.

Another of the writer's responsibilities was the preparation of solutions for the manufacture of silvered hollow reflectors of which large numbers were used behind oil lamps. It had been customary to use condensed boiler steam for making the silver solution. The condensate contained oil which spotted the reflectors. To overcome this difficulty, faucets were attached to the bottoms of water tanks so that oil floating on the upper surface would not enter the demijohns containing ammoniacal silver solution or the reducing sugar solution. Also, ammonia solution was syphoned into the silver nitrate solution through a glass tube stirrer to insure a correct end-point. Previously, so many quarts of ammonia water had been poured onto so many pounds of dissolved silver nitrate. The ammonia from the large demijohn became weaker on standing; results varied. Furthermore, it developed that the silver nitrate could be cut 25 per cent and still yield good reflectors. One of the problems was pin-holes, now almost entirely eliminated in some modern processes.

The silver mirror in which we see ourselves through the glass not only lacks complete visible-light reflecting power, but has the disadvantage of further color distortion by the glass host. Aluminum near-side mirrors produced by vapor condensation reflect the visible spectrum much better. Similarly made chromium mirrors may be transparent. When the transmission spectra of other metallic films become better known, more unusual mirrors may be expected.

Metallic continuous-pattern applications to plate glass have made it available for radiant heating through electrical resistance of the metal. Chemically applied transparent films have also been developed for similar use. Plate glass has been given thin surface films of magnesium fluoride and other chemicals to eliminate surface reflection and glare and to enhance light transmission. The ferrous ions in the glass and applied dyes absorb heat and light. New glasses reflect heat, in some cases as much as 75 per cent.

By the summer of 1904, the alabaster glass was in production, the laboratory was closed, the chemist was dismissed. The writer decided on further study. Here, another experience comes to mind. In a course in advanced analytical chemistry, he was told to determine the alkalies in feldspar, separately, after heating the spar in platinum with calcium carbonate and ammonium chloride, then leaching with water. Results were not consistent. After many determinations, three analyses were selected from a dozen or more because they agreed fairly well. When the professor of analytical chemistry was asked if they were correct he replied, "I don't know" and when asked why, he said "I have received analyses of this feldspar for three years and the alkali reports vary by as much as 25 per cent. I do not have enough concordant values to render a decision." What a contrast to the recently published method for determining the alkalies separately and rapidly with a flame spectrophotometer.

There are other contrasts. To one who knew the hand-

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blown window glass plant, and then saw the unbelievable Lubbers process blow and draw cylinders 30 inches in diameter and 40 feet high, it was quite a shock to see these scrapped for the continuous sheet-drawing machines of Fourcault (1902) and Colburn (1903). The inventions seemed wonderful, although the principles were simple. Storage and weighing and charging of raw materials and cullet are almost automatic. However, what impresses the scientist more is the composition control. the furnace atmosphere control, the temperature and heat-distribution controls, corrosion-resisting metals and alloys, super-refractories. Glass flow control has traveled from above the surface to underneath. Some modern drawn sheet is practically as good as ground and polished plate glass. The old hand-blown window glass horribly distorted objects viewed through it.

Plate glass has evolved from the old French castings of 1688 to continuous sheet. Speaking of grinding and polishing prompts another observation. Machines have improved in plate glass plants, and announcement has come of the simultaneous grinding and polishing of both surfaces. Plate glass surfaces can attain an almost unbelievably uniform contour. In optical polishing, knowledge of the influence of crystal form has permitted the selection of superior polishing powders. These, with the previously levigated materials, leave little to be desired.

What about durability and preservation? Around 1900-1910 it was not uncommon to find catsup bottles and food jars that were so high in alkali as to turn the red color of tomatoes brown. Medicinals were sometimes spoiled, especially colloidal substances. Our common bottles are far superior to the old product. Manufacturers pride themselves on the good composition. Ampul and other special glasses are available. The most delicate antibiotics, serums, antitoxins, are safe. Durability is being extended. New phosphate glasses resist the action of hydrofluoric acid. Glass surfaces are protected from weathering and attack by silicone applications; it seems no longer to be necessary to stack or store panes with special paper partitions.

While on the subject of hollow containers, why not consider lamp bulbs. The glass for ribbon machines, the latest of the bulb producers, is remarkably homogeneous and takes studied etching without serious loss of desirable mechanical and thermal properties. Transmission and reflection are better than in the earlier bulbs. Special bulbs of glasses that transmit the far ultraviolet, near ultraviolet, infrared, are available. Other special glasses hold sodium vapor and other metallic vapors. The 1000-watt mercury arc is the size of a cigarette. Electron-beam radar bulbs, neon-filled aviation beacons, punishment-taking special glass bulbs for radio and television transmission and reception are among our scientific marvels. Color television reception in the theatre and home is an experimental reality, may soon enter our homes. Where phosphors must change invisible or poorly visible radiations into bright light, new glasses have compositions which make them better phosphor acceptors. Again risking the comparison of the complete spectrum to a piano keyboard, and realizing that the portion (4000 to 8000 Angstrom units) visible to the unaided eye corresponds to only one black key, isn't it marvelous, almost unbelievable, what science has enabled man to record?

In the optical field we have approached a refractive index of 2 and extremely low dispersion. We can make optical glasses to absorb or transmit almost any portion of the spectrum at will. From the mercury-vapor lamp with its fused-quartz or high-silica envelope, we get rays to sterilize atmospheres or objects exposed to them; the household refrigerator can safely store food at higher temperatures than formerly; the rays can tenderize meat, permitting of the economical use of cheaper cuts. We can stop a culture in a vessel that admits ultraviolet light at any desired moment; we can determine Vitamin C in a red flask that screens out destructive rays; we can flood objects with various colors, day or night through scientific camouflage. We have spectacle lenses not only to correct defective vision to normal, but new cataract lenses of reduced thickness and weight. Our glare prevention lenses vary from the lighter shades and low light absorbers to very dark goggles for oxyacetylene and arc cutting and welding.

It has been a long step from the old smoked glasses and early Crookes lenses to those now available. Dichroism-producing rare earths have supplemented ordinary colorants so that we may not only protect the eyes from glare, but simultaneously enhance reds and greens.

Glasses have been produced experimentally, and to some extent commercially, for the absorption of harmful radiations like high energy X- and gamma rays, and slow neutrons. We have had X-ray shielding glass for many years, but the new glasses are more effective and less prone to discolor under radiation.

But also, we have learned that the light transmission or absorption of glasses depends on temperature. We know that normal selenium ruby glass is red at ordinarily encountered temperatures, say from 32 to 100°F., yellow at the temperature of liquid air, black near the softening point of the glass. While less pronounced, the values also vary for other glasses.

Controls have made it possible to blow and draw goggle glass which is as good as ground and polished glass, and which has a more durable surface. We make the tiny high-power microscope objectives, and cast, grind, polish, and metallize a 200-inch reflector.

Glass tableware is in common use, can be purchased at the "five-and-ten"; there also is found attractive irridescent and art glass. And to think that at one time only a king could drink from glass, and that irridescent art glass was a luxury. What was, at one time, known only as laboratory glass is now found in the kitchen as ovenware, frying pans, stove doors, etc. The chemist, the physicist, the engineer have made these things possible.

At the beginning of the century it was necessary to use trial methods to obtain low-expanding glasses. The Schott-Winkelmann factors were only approximate. Numerous more recent studies have given us more dependable factors, and have taught that the thermal expansion of a substance may be dependent, partially, on its concentration in the glass and on the nature of other components. We have learned that bond strengths and atomic and ionic radii influence results and that linkages and the nature of bonds also govern the situation. Valence is no longer a whole number. The old idea that metals only replace each other has been superseded by that of glass formers and glass modifiers. As we have seen, aluminum

(*Continued on page* 456)

G.C.M.I. MAKES WEST COAST APPOINTMENT

Frank H. Wright has been appointed Assistant West Coast Manager of Glass Container Manufacturers Institute, according to an announcement by Victor L. Hall, General Manager of the Institute.

For fourteen years, Mr. Wright was a sales executive for Trans World Airlines in Chicago, and San Francisco. A Dartmouth College graduate, he served in the Navy during World War II, being released as a Lieutenant Commander.

Headquartered in San Francisco, Mr. Wright will work directly with Richard L. Cheney, West Coast Manager for the Institute.

SAFETY COUNCIL ISSUES EMPLOYEE MANUAL

"Working Together for Safety" is the title of the National Safety Council's new employee rules manual. The handy 32-page booklet contains instructions in safe work habits applicable to employees in most plants.

The practical experiences of workers, supervisors, and safety specialists have established the safe practices covered, beginning with a list of general safety regulations and continuing with special sections on machine operation, hand tools, power tools, protective clothing, fire prevention, materials handling, and many other related topics.

BOOK REVIEW

Introduction to Solid State Physics
By Charles Kittel, Professor of Physics
University of California

This volume is intended as an introductory textbook in solid state physics for senior and beginning graduate students in physics, chemistry, and engineering. The author's object was to write an elementary and short account of representative aspects of the physics of solids.

The level of presentation supposes that the reader will have a general familiarity with modern atomic physics to the extent of the under-graduate courses offered under this title in many universities. A course in quantum mechanics is not a prerequisite to reading this book, but the reader should have been exposed to the Planck radiation law, the de Broglie relation, the Bohr theory of the hydrogen atom, the Zeeman effect, and the wave equation for free particles. Advanced topics in solids, in particular those requiring a formal background of quantum mechanics, are developed in appendices.

Published by John Wiley & Sons, Inc., New York, New York; 396 pages; $7.00.

• The Libbey-Owens-Ford Glass Company's catalog, "Glass for Construction," was awarded an honorable mention in the 1953 Product Literature Competition of the American Institute of Architects, it has been announced by F. R. Hawkins, Advertising Manager.

SEMI-ANNUAL REPORTS

Sales of $56,210,445 for the first six months of 1953, 19 per cent higher than the $47,052,440 total for the same period last year, and net earnings of $2,858,515 have been reported by Owens-Corning Fiberglas Corporation.

Glass Fibers, Inc. reported sales of $2,762,233 for the first six months, as compared with $1,799,685 reported for 1952.

Net earnings of $8,594,594, equal to $1.66 a share, for the first six months of 1953 have been reported by Libbey-Owens-Ford Glass Company. This compares with $7,458,068, equal to $1.45 a share, in the corresponding period last year.

Mathieson Chemical Corporation reports net income of $8,828,633, or $1.62 a share, as compared with last year's $5,135,516, or $1.63 a share.

Net sales for the six-month period reported by Diamond Alkali Company were $43,439,558, an increase of 12 per cent over 1952's $38,738,446. Net income was $3,438,122, equal to $1.40 per share, as compared with $2,844,672, or $1.14 a share, during the corresponding period in 1952.

DIRECTOR OF PURCHASES APPOINTED BY O-I

The appointment of George W. Cook as Director of Purchases for the Owens-Illinois Glass Company has been announced by Hugh C. Laughlin, Executive Vice President.

Mr. Cook was formerly Assistant Director of Purchases. He succeeds C. L. Rice, who has resigned to accept new duties in the Administrative Division.

Mr. Cook, as Director of Purchases, will be responsible for the over-all purchasing activities of the company. A native of Alton, Illinois, he attended Washington University in St. Louis where he majored in business administration. He has been associated with Owens-Illinois Glass Company since 1925.

Mr. Rice will continue on the staff of the Administrative Division, handling certain company-wide procurement matters, as well as the development of a program for the integration of engineering purchasing. He will also act as adviser to the Director of Purchases and handle special assignments.

WICKWIRE-SPENCER APPOINTMENT

J. W. Campbell has been named Assistant Works Manager of The Colorado Fuel and Iron Corporation's Wickwire-Spencer plant in Buffalo, New York, according to a recent announcement.

Mr. Campbell assumes his duties as second in command of the corporation's second largest plant after 27 years of service. Since 1950, he has been wire mill superintendent of the Buffalo plant. He had formerly been associated with the testing department of the Goddard Works of Wickwire-Spencer.

Inventions and Inventors

Feeding and Forming

Automatic Lubrication of Neck Pins. No. 2,638,718. Filed September 19, 1950. Issued May 19, 1953. One sheet of drawings (none reproduced). Assigned to Emhart Manufacturing Company by George E. Rowe.

This invention relates to the automatic lubrication or coating of the tips of neck pins. Such pins are employed in glassware forming machinery of the so-called blow-and-blow type in which a neck pin molds the corkage recess of the ware prior to blow-molding a parison. Subsequently the parison is transferred into a finishing mold for blowing into a bottle or other type of blown ware.

A roller automatically dobs the neck pin in place and applies a uniform coating of graphite to the tips preparatory to each parison molding operation. The operation is carried out without interrupting the rest of the forming machine operational cycle in which it is integrated.

The patent contains three claims and the references cited were: 286,892, Andrus, Oct. 16, 1883; 805,299, Kastenhuber, Nov. 21, 1905; 988,636, Fogle Apr. 4, 1911; 1,439,372, Lott, Dec. 19, 1922; 2,142,954, Rowe, Jan. 3, 1939; 2,142,955, Rowe, Jan. 3, 1939; 2,246,463, Garratt, June 17, 1941; 2,564,308, Nagel, Aug. 14, 1951; and THE GLASS INDUSTRY, Vol. 26, No. 3, March 1945, pages 125 to 127 and 151, "Colloidal Graphite and Its Use in the Glass Industry."

Method for Mixing Molten Glass. Fig. 1. Patent No. 2,641,454. Filed January 27, 1951. Issued June 9, 1953. One sheet of drawings. Assigned to Glass Fibers, Inc. by Dominick Labino.

An object of the invention is to provide a homogenizing apparatus that is adapted to mixing molten glass that is discharged from a glass furnace. It is especially adaptable for the manufacture of glass products such as continuous length glass filaments. The mixing action is accomplished as shown in Fig. 1.

A refractory cylindrical sleeve 20 extends downwardly through the opening 16 in the cover 15 and into a chamber 11. The sleeve 20 has a plurality of openings 21 positioned near the closed bottom wall 22 of the sleeve 20, the openings 21 being arranged radially of the axis of the sleeve 20.

The sleeve 20 is adapted to be rotated within the chamber 11 and is thus rotatably supported by an anti-friction bearing 25.

Molten glass flows from the chamber 11 through the discharge opening 35 in the bottom wall of the body 10 of the homogenizer and axially thereof and then passes through a funnel 36 to a suitable glass handling apparatus. The flow of glass through the sleeve 20 and the chamber 11 is regulated by the flow of glass from the glass melting furnace, the flow being controlled to such an extent as to not overfill the homogenizer.

The glass within the chamber 11 is heated by means of a pair of electrodes 37 placed on opposite sides. A second pair of electrodes 38 are similarly positioned on opposite sides of the chamber 11 and near the upper end

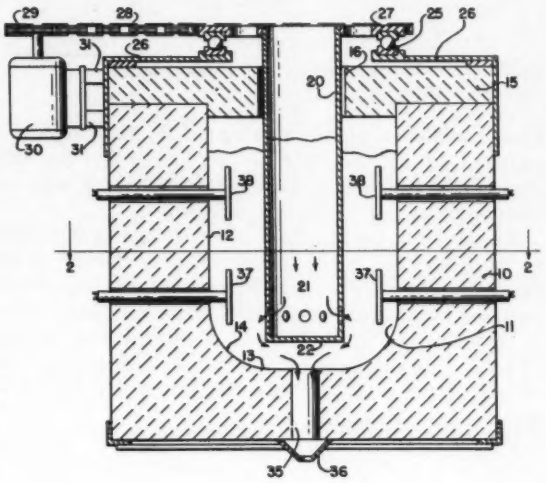


Fig. 1.

to provide for separate control of the temperature of the glass in the upper portion of the chamber 11.

The fluidity of the glass in the upper portion of the chamber can be maintained somewhat greater than that in the lower portion of the chamber to provide for ease of liberation of gas from the molten glass. Also, this provides for a very slow intermixing of the molten glass from the upper portion of the chamber into the lower portion of the chamber to avoid complete stagnation of any glass in any part of the chamber.

The patent contains 11 claims and 12 references were cited.

Glassware Blowhead Arrangement. Fig. 2. Patent No. 2,640,298. Filed August 2, 1950. Issued June 2, 1953. Two sheets of drawings. Assigned one-half to Henry C. Daubenspeck by Samuel E. Winder.

This invention relates to a glassware blowhead arrangement which is pneumatically actuated from an operating position and at the same time the blowhead conducts air under pressure to the mold so as to enlarge the product to be molded.

During the retraction of the blowhead, the glass parison is inserted into the mold and is normally allowed to remain for an interval during which it reheats. After reheating of the parison, the blowhead advances to the position of Fig. 2 for blowing out the parison.

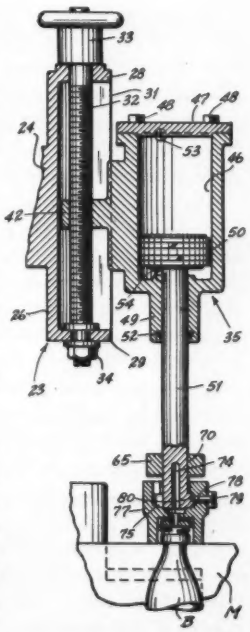


Fig. 2.

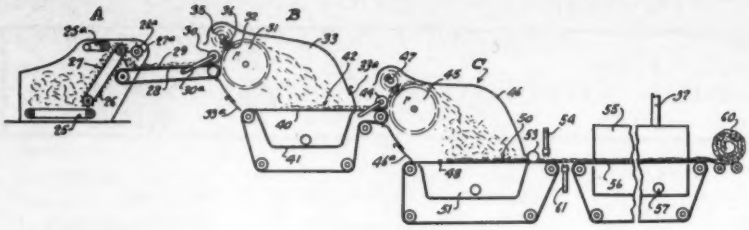


Fig. 3.

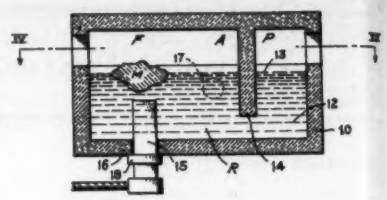


Fig. 4.

Upon completion of this blowing phase, the blowhead is retracted so that the mold can be opened and the ware removed. Subsequently the mold is recharged with another parison, and the cycle is repeated.

The stroke of the blowhead is determined by the stroke of the piston 50. Since the elevation of the top of the molds M may vary with different ware, the adjustment provided by the knob 33 is used. With the piston down, as shown in Fig. 2, the knob 33 is adjusted with the nut 34 loose until the head 77 is in proper engagement with the top of the mold M. Then the nut 34 is tightened to hold the adjustment thus made.

The two-piston motor air lines 53 and 54 are connected to a typical four-way valve that is operated in a predetermined cycle related to the operation of the whole glass machine. By this four-way valve arrangement, air under pressure is admitted to the top of the cylinder 46, while the space below the piston is exhausted to atmosphere, and the piston is driven down to the position of Fig. 2. When the blowing is complete, the air connections just mentioned are reversed. The construction lends itself to interchangeability of parts which improves the facility of servicing the equipment.

The patent contains seven claims and the references cited were: 1,695,894, Glaspey, Dec. 18, 1928; 1,818,725, Lorenz, Aug. 11, 1931; 1,832,080, Allen, Nov. 17, 1931; 1,843,159, Ingle, Feb. 2, 1932; 1,854,471, Hofmann, Apr. 19, 1932; and 1,869,920, Soubier, Aug. 2, 1932.

Method of Forming Glass Fiber Mats. Fig. 3. Patent No. 2,639,759. Filed July 3, 1947. Issued May 26, 1953. One sheet of drawings. Assigned to Owens-Corning Fiberglas Corporation by Allen L. Simison.

A method for producing resilient and uniform fibrous glass mats adapted for use as a reinforcement for synthetic resin is shown in Fig. 3.

The apparatus comprises preliminary fiber distributing mechanism A, including a hopper for receiving the bulk fibrous material to be fed to the machine. As the lifting apron conveys the fibrous material upward, a short belt 25a removes any unduly large masses from the apron so that a substantially uniform layer of fibers is carried to the feeder belt 28.

The feeder belt 28 conveys the fibrous material as a substantially uniform sheet 29 of loosely intermatted strands toward the first picker station B.

As the mat issues from beneath the roll 30, it is engaged by a picker drum 31 or roll provided with teeth 32 which may be in the form of radially extending spikes arranged in parallel rows around the surface of the drum. The mat is carried by the conveyor 40 to a second picker station C which is substantial duplication of the picker station B just described.

As the redistributed strands are discharged from the roll, they are collected on a second traveling foraminous belt 48 to form a finished mat or web 50. As the mat 50 issues from the hood 46, a suitable binder or impregnant may be applied as by spraying from spray guns indicated at 54.

It is customary to partially cure or set the binder so that the material can be readily handled. For this purpose an oven 55 may be provided through which the mat 50 is transported by means of a conveyor 56.

This type of mat is well suited for providing bulk to plastic structures and may be employed as a material to which sheets of fabric are adhered to produce a desired surface on the molded article.

The patent contains four claims and the following references were cited: 1,420,162, Toles, June 20, 1922; 1,881,932, Powell, Oct. 11, 1932; 1,928,699, Neal, Oct. 3, 1933; 1,948,395, Powell, Feb. 20, 1934; 2,233,433, Smith, Mar. 4, 1941; 2,467,291, Brelsford et al., Apr. 12, 1949; and 2,477,555, Roberts et al., July 26, 1949.

Furnaces

Electric Melting of Glass. Fig. 4. Patent No. 2,636,913. Filed July 4, 1945. Issued April 28, 1953. Four sheets of drawings. Assigned to the Societe Anonyme des Manufactures des Glaces et Produits Chimiques de Saint Gobain by Roger Emile Lambert.

New applications of electric heating for the melting of glass is shown in Fig. 4. The heating method used consists in placing in the melting zone, and in the central portion of same, vertically adjustable electrodes that are introduced through the bottom of the container and are so arranged as to be in contact with the glass along a part of the height of the bath. The glass in the zones surrounding the electrodes, as a result of the concentration of the current lines, is heated to a higher temperature than the glass of the other parts of the bath.

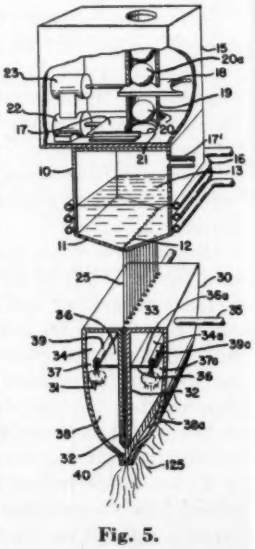


Fig. 5.

Electrodes 15 placed in the melting compartment F penetrate through the bottom 16 of the tank. These electrodes are located in the bath at such a level that their upper part comes near the lower portion of the lump M of raw materials.

In the refining zone A is situated an electrode 17 placed transversely to the glass bath and practically on the whole width of same. Such electrode is immersed in the upper layers of the bath. Owing to the

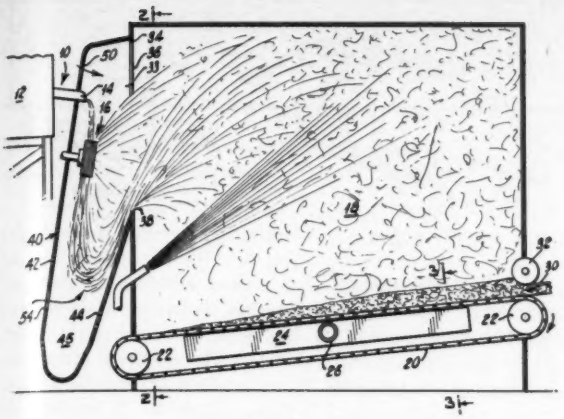


Fig. 6.

vertical arrangement of the melting electrodes 15, the glass surrounding the electrodes is overheated and tends to rise vertically while remaining in contact with the electrode itself. When the glass reaches the upper layers of the bath, it is at a very high temperature that causes a rapid melting of the batch materials of the lump M.

The electrode 17 acts only on the upper part of the bath and in a zone between the melting zone F and the zone of extraction of the finished glass, P. The melted glass, not yet refined and containing bubbles, gathers in said intermediate zone. Electrode 17 acts on the glass as a refining electrode. An advantage of this type of furnace is the possibility of varying the level of the upper end of the vertical electrodes in the melting zone. This type of furnace also produces high temperatures and intense local heating in the glass and at the same time does not overheat the container walls.

The patent contains 18 claims and 17 references were cited.

Glass Wool and Fiber

Apparatus for Producing Glass Fibers. Fig. 5. Patent No. 2,635,285. Filed June 3, 1950. Issued April 21, 1953. One sheet of drawings. Assigned to Glass Fibers Inc. by Harry A. Toulmin, Jr.

An improved method for making staple glass filaments of greatly increased production is shown in Fig. 5. In this invention a body of glass is heated within a heating chamber 10 to molten condition. The heating chamber is provided with a plurality of small openings 12 in one wall, preferably the bottom wall, through which the molten glass within the chamber will be extruded by the application of pressure within the chamber upon the body of molten glass. The molten glass will issue from the openings in the heating chamber in small streams which will cool quickly as the streams leave the heating chamber to form small glass fibers or glass strands.

The heating and attenuating apparatus 30 consists of a closed pressure chamber 31 having an intermediate wall 32 that is provided with a series of longitudinally extending bores 33 into which the individual glass fibers or strands 25 are introduced and from which attenuated glass filaments 125 are discharged as staple.

The closed heating chamber 31 has the two compartments 34 and 34a interconnected across the ends of the chambers so that high pressure air delivered into the chamber 34a through the conduit 35 will also be delivered into the chamber 34.

The patent contains four claims and the references cited were: 2,175,225, Slayter, Oct. 10, 1939; 2,294,266, Barnard, Aug. 25, 1942; 2,489,242, Slayter et al., Nov. 22, 1949; and 2,571,025, Fletcher, Oct. 9, 1951.

Apparatus for Fiber Collection. Fig. 6. Patent No. 2,641,028. Filed July 6, 1948. Issued June 9, 1953. One sheet of drawings. Assigned to Johns-Manville Corporation by Harmon Steele. This patent is a continuation of Patent No. 2,561,843 by John E. Coleman.

A unique method of producing blankets or felts from mineral wool fibers is shown in Fig. 6. The furnace includes a discharge trough 14, through which a stream of molten slag, rock, glass, or other fiber-forming material is drawn from the furnace and discharged in position to be contacted by a rotor fiberizing device indicated at 16. The latter is of the type including, preferably, a plurality of rotors supported to have their peripheral edges in position to be contacted by the molten material discharged from the trough 14.

A fiber collection chamber 18 is located adjacent and forwardly of the fiberizing device 16. Collection chamber 18, which is relatively air-tight except for the openings to be described, includes a bottom wall comprising a conveyor 20 supported on members 22 and adapted to be driven in the direction indicated by the arrow. A suction box 24 is located intermediate the upper and lower reaches of the conveyor with its open side adjacent the upper reach. The suction box may be connected to any suitable air-exhausting device (not shown) as by means of duct 26.

The forward wall of the collection chamber is provided with an exit port 30 through which the accumulated fibers are delivered by the conveyor to any suitable rehandling apparatus.

The patent contains one claim and the references cited were: 299,111, Burns, May 27, 1884; 2,255,227, Parsons, Sept. 9, 1941; 2,316,451, Page, Apr. 13, 1943; 2,317,895, Drill, Apr. 27, 1943; and 2,319,666, Drill, May 18, 1943.

Sheet and Plate Glass

Apparatus for Prepressing Curved Laminated Glass. Fig. 7. Patent No. 2,635,973. Filed March 9, 1950. Issued April 21, 1953. Two sheets of drawings. Assigned to the Libbey-Owens-Ford Glass Company by Rollin L. Swindler.

The above invention relates broadly to the manufacture of laminated safety glass and more particularly to an improved method and apparatus for prepressing the assembled glass and plastic laminations preliminary to final compositing.

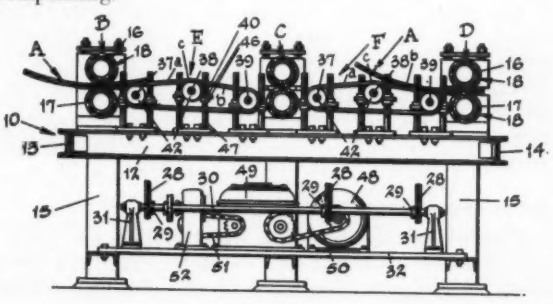


Fig. 7.

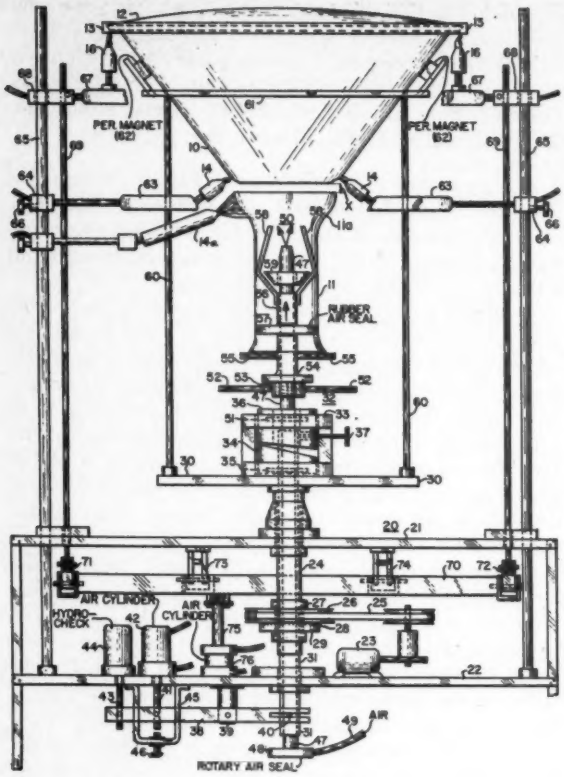


Fig. 8.

In order to remove air and moisture and also to obtain a sufficient initial bonding of the glass and plastic to prevent the pressing fluid used during final compositing in an autoclave from seeping in between the laminations, it is desirable that the assembled laminations be subjected to a preliminary pressing operation. Upon emerging from the pressing rolls B, the glass-plastic sandwich is received upon the conveyor means E which, as shown in Fig. 7, has an upwardly inclined portion "a" followed by a descending portion "b".

The glass-plastic sandwich is then engaged by the treads 18 of the second pair of horizontal rolls C which serve to press a longitudinal strip along one marginal edge portion of the sandwich which extends from the central strip previously pressed by rolls B to one edge of the sandwich. In passing between the rolls D, a longitudinal strip along the opposite marginal edge portion of the sandwich is pressed, thereby completing the pressing of the sandwich across its entire width. Thus, the combined tread width 18 is at least equal to the sandwich width.

The patent contains 9 claims and the references cited were: 1,190,698, Abramsen, July 11, 1916; 1,871,982, Geyer, Aug. 16, 1932; 1,897,862, Randall, Feb. 14, 1933; 1,944,277, Schoepfer, Jan. 23, 1934; 2,025,115, Lytle, Dec. 24, 1935; 2,142,445, Helwig, Jan. 3, 1939; 2,431,353, Varner, Nov. 25, 1947; 2,459,295, Skoog, Jan. 18, 1949; and 2,525,980, Walters, Oct. 17, 1950.

Tube and Cane Machines

Sealing Cathode-Ray Tubes. Fig. 8. Patent No. 2,639,555. Filed October 15, 1949. Issued May 26, 1953. Two sheets of drawings. Assigned to The Rauland Corporation by Albert L. Buttino and Howard R. Patterson.

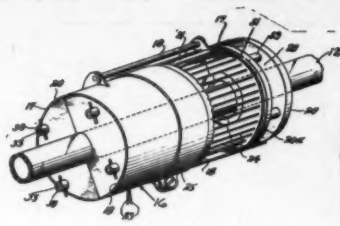


Fig. 9.

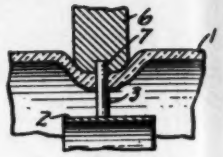


Fig. 10.

An apparatus suitable for sealing a glass-face plate to a metallic cone used in the fabrication of cathode-ray tubes is shown in Fig. 8. The apparatus includes a table 20 having a top 21 and a shelf 22. An electrical motor 23 is mounted on the shelf 22 to rotate a drive tube 24 by means of a belt drive 25. The belt drive 25 is coupled to a drive wheel 26 rotatably mounted on tube 24, and motion is translated from the wheel 26 to the drive tube 24 through a clutch arrangement.

A lift tube 31 is mounted concentrically within the drive tube 24, and extends beyond the spindle 30 into a cylindrical cam arrangement 32. An air tube 47 is mounted concentrically within the lift tube 31.

A plurality of burners 14 are mounted on a ring 63 surrounding the assembly 10-11 and this ring is supported by collars 64 adjustably mounted on vertically extending guide rods 65. When air is introduced into the air cylinder 76, the frame 70 and, hence, burners 16 are moved upwards to the position shown in Fig. 8. On the other hand, when the air in the cylinder 76 is released, the burners 16 move downward from their illustrated position to enable an operator to remove the cathode-ray tube envelope from the machine.

The entire sealing operation is carried out in a single machine and with a minimum of space and operation. The patent contains six claims and the following references were cited: 2,271,658, Miller, Feb. 3, 1942; 2,296,307, Power, Sept. 22, 1942; 2,386,820, Spencer, Oct. 16, 1945; 2,482,494, Knochel et al., Sept. 20, 1949; and 574,091, Great Britain, Dec. 20, 1945.

Miscellaneous Processes

Device for Heating Glass Pipe. Fig. 9. Patent No. 2,633,522. Filed February 7, 1950. Issued March 31, 1953. One sheet of drawings. Abram S. Berg and Arsenius N. Goregliad.

A device for heating glass pipe is shown in Fig. 9, such pipe being used to interconnect various parts of a chemical plant. In bending and connecting glass pipe, it is highly important to uniformly heat the pipe over the desired area and length. Heater 16 comprises a pair of heat-insulating covers 17 and 18 hinged together by pin 19 and hinge member 21 which encompass pipe 12.

In operation, the two halves of heater 16 are opened about hinge pin 19, placed around pipe 12, and closed firmly held by clamp 25. When power is applied to heating elements 22 and 24, pipe 12 is heated solely by radiation since the heating elements are protected from air currents and insulator plates 31 are good thermal insulators. Since elements 22 and 24 are spaced some distance from pipe 12 their strands may be spaced apart substantially without objectionable variation of the temperature of pipe 12 circumferentially thereof. Likewise,

(*Continued on page* 446)

Thermal Expansion Coefficients and The Structure of Glass

Like many other properties of glass, the coefficient of expansion is roughly an additive property. Various factors for calculation have been proposed by several investigators. A. Winkelmann and O. Schott were pioneers among them. More reliable factors, however, were deducted later by S. English and W. E. S. Turner. These factors, based upon the weight percentage of oxide components or the molar percentage of assumed compounds in the glass serve the practical purpose of calculating thermal expansion coefficients from glass composition.

From the viewpoint of glass structure, Kentaro Takahashi (*Journal of the Society of Glass Technology, News and Reviews*, April 1953) has calculated a new set of factors for the expansion coefficients for oxide components based upon their cationic percentage. In order to calculate the thermal expansion coefficient of silicate glasses on a theoretical basis, it is assumed that the expansion is made up of the changes in interatomic distance between oxygen and silicon ions (network formers) or other cations (network modifiers).

The expansion coefficient of glass is approximately a quadratic function of temperature. Thus the mean coefficient varies with the temperature range considered. For this reason a clear line must be drawn between the lower range coefficient (approx. 0°-100°) and the higher range coefficient (approx. 0°-400°).

In silicate glasses, the main network former is Si. The Si-O bond is a covalent bond with SO per cent ionic character and is far more covalent than any other M-O bond contained in such glasses. It is assumed that variation of distance between Si and O occurs as much in silicate glasses as in silica glass. The mean linear expansion coefficient of silica glass is 48×10^{-8} for the range 0°-100° and 57×10^{-8} for the range 0°-400°, so the expansion factor for SiO_2 is taken as 0.5 and 0.6, respectively. On the assumption of activity, the expansion coefficient of glass may be calculated by means of the equation:

$$a = \rho_1 a_1 + \rho_2 a_2 + \ldots\ldots\ldots \rho\eta\, a\eta,$$

in which a is the linear coefficient of the glass, ρ_1, ρ_2, ... ρ_η are the cationic percentages of the various components in it, and a_1, a_2, ... a_η are the thermal expansion factors for the various oxides.

From the known factors for SiO_2 and $NaO_{0.5}$, values for other oxides were calculated from data on the SiO_2-$Na.O_{0.5}$-MO series of glasses. The calculated factors so obtained are tabulated in Table 1. The observed and calculated values were compared for 197 glasses, and the difference between these values, expressed as a percentage, was calculated. For the lower temperature range, the values with errors larger than 7 per cent are only 3 in 153, and for the higher range the values with errors larger than 8 per cent are 6 in 100.

A clear line can be drawn between the lower range factors (0°-100°) and the higher range factors (0°-400°).

TABLE I

Expansion Factors of Oxide Components

Oxide Composition MO_x	Factor (0°-100°)	Factor (0°-400°)	Ionic Radius (A)	Co-ordination Number (2)	Electrostatic Bond Strength (S)	Cationic Field Strength (f)
SiO_2	0.50	0.60	0.39	4	1	1.56
TiO_2	— 3.5	—	0.64	6	2/3	1.04
ZrO_2	—14.3	—	0.87	6	2/3	0.83
$AlO_{1.5}$	2.7	3.1	0.57	4	3/4	0.97
$FeO_{1.5}$	3.2	5.0	0.67	4	3/4	0.85
BeO	—	5.5	0.34	4	1/2	0.83
MgO	3.3	6.0	0.78	4,6	1/2, 1/3	0.51, 0.45
ZnO	5.0	8.0	0.83	4	1/2	0.48
FeO	10.0	13.0	0.83	6	1/3	0.43
MnO	10.0	13.4	0.91	6	1/3	0.40
CaO	13.0	14.5	1.06	7	2/7	0.35
PbO	16.0	18.0	1.32	4,(8)	1/2, (1/4)	0.29
BaO	23.0	25.0	1.43	8,(10)	1/4, (1/5)	0.24
$LiO_{0.5}$	—	24.5	0.78	6	1/6	0.23
$NaO_{0.5}$	26.9	29.5	0.98	6	1/6	0.19
$KO_{0.5}$	—	33.3	1.33	9,(8)	1/6, (1/8)	0.13

Windows for Protection Against High-Intensity Gamma Radiation

Editor's Note: Of interest to glass manufacturers as an indication of how glass is being utilized in nuclear research in this release by the Atomic Energy Commission, which was distributed at the recent Basic Material Conference (New York, June 16-18.)

The radiation hazard accompanying the handling of large amounts of radioactive materials is frequently so great as to preclude the possibility of handling the materials either directly or by a set of long tongs. Recourse must therefore be had to performing the operations by remote control and viewing them indirectly. Periscopes and mirrors have been used in spite of drawbacks which may involve difficulty in discrimination of depth, an inability to view the operation from various vantage points and, in some cases, considerable eye strain.

One method used to overcome these difficulties is the so-called "liquid-shielding window" in which the source of radiation and the operator are separated by a transparent window. In dealing with 5,000 to 15,000 Curies of an energetic gamma-ray emitter, such windows must meet several requirements.

The first requirement is that the liquid window have the same shielding effectiveness as several feet of concrete. The second is that the window shall possess certain desirable optical properties: high transmission in the visible region of the spectrum, freedom from local striations, a minimum of haze or turbidity, a high index of refraction (to permit a large angle of view through a comparatively small window), and stability of color and clarity in the presence of intense and continued radiation. The third requirement is that the pane of glass nearest the source of radiation not become darkened with time (plate glass is totally unsuitable).

A saturated solution of zinc bromide (density 2.54 or 16.5 lbs/$ZnBr_2$ per gallon of solution) has been used as the liquid filling in windows whose absorption for gamma radiation can be made equivalent up to 5 feet

(*Continued on page* 458)

Current Statistical Position of Glass

Employment and payrolls: Employment in the glass industry during the month of May 1953 was as follows: *Flat Glass:* A preliminary 31,000 persons reported indicating a drop of .6 per cent from the adjusted April employment of 31,200. *Glass and Glassware—Pressed and Blown:* A preliminary 91,000 persons reported, which is .3 per cent less than the adjusted figure of 91,300 for April. *Glass Products Made of Purchased Glass:* A preliminary 14,600 persons reported. This is 5.8 per cent less than the adjusted figure of 15,500 reported for April.

Payrolls in the glass industry during May 1953, based on average weekly earnings, were as follows: *Flat Glass:* A preliminary $13,832,003, an increase of 3.8 per cent over the adjusted $13,318,552 reported for April. *Glass and Glassware—Pressed and Blown:* A preliminary $27,039,437, representing an increase of .4 per cent over the adjusted $26,926,991 reported for April. *Glass Products Made of Purchased Glass:* A preliminary figure of $3,727,672 reported, indicating a drop of 7.2 per cent from the adjusted April figure of $4,020,587.

GLASS CONTAINER SHIPMENTS

(All Figures in Gross)

	June, 1953
Narrow Neck Containers	
Foods	923,160
Medicinal & Health Supplies	916,240
Chemicals, Household & Industrial	753,060
Beverages, Returnable	1,194,931
Beverages, Non-returnable	118,178
Beer, Returnable	370,943
Beer, Non-returnable	779,226
Liquors	704,294
Wines	292,499
Toiletries & Cosmetics	549,100
Sub-total (Narrow)	6,601,631
Wide Mouth Containers	
Foods	*2,662,942
Dairy Products	220,542
Medicinal & Health Supplies	286,602
Chemicals, Household & Industrial	120,480
Toiletries & Cosmetics	130,962
Packers' Tumblers	176,184
Sub-total (Wide)	3,597,712
Total Domestic	10,199,343
Export Shipments	221,272
TOTAL SHIPMENTS	10,420,615

*This figure includes Home Canning.

GLASS CONTAINER PRODUCTION AND INVENTORY

(All Figures in Gross)

		Production June 1953	Stocks June 1953
Foods; Medicinal & Health Supplies; Chemicals, Household & Industrial; Toiletries and Cosmetics	Narrow Neck	3,454,563	3,574,603
	Wide Mouth	*3,401,348	*3,327,542
Dairy Products		220,500	312,222
Beverages, Returnable		1,074,653	943,459
Beverages, Non-returnable		134,794	98,404
Beer, Returnable		367,556	230,573
Beer, Non-returnable		831,989	506,127
Liquors		844,027	799,712
Wines		315,427	316,577
Packers' Tumblers		205,543	151,832
TOTAL		10,850,400	10,261,051

*This figure includes Home Canning.

Glass container production during June 1953, based on figures released by the Bureau of Census, fell off somewhat to reach 10,850,400 gross. This is 1.3 per cent below the 11,001,971 gross produced during May 1953. During June 1952, production of glass containers was 10,079,657 gross, or 7.6 per cent below June this year. At the close of the first half of 1953, glass container manufacturers have produced a total of 61,132,942 gross. Compared with the corresponding period ending June 1952 when production was 56,945,785 gross, 1953 is running 7.3 per cent ahead of 1952.

Shipments of glass containers during June also fell off slightly and were reported to be 10,420,615 gross. Compared with May shipments of 10,753,724 gross, this is a drop of 3 per cent. During June 1952, shipments were 9,850,465 gross, which is 5.7 per cent below June this year. At the end of the half-year period, 1953, shipments of glass containers have reached a total of 60,417,213 gross. Compared with the first six months of 1952 when shipments were 55,970,836 gross, 1953 shipments are 7.9 per cent ahead of 1952.

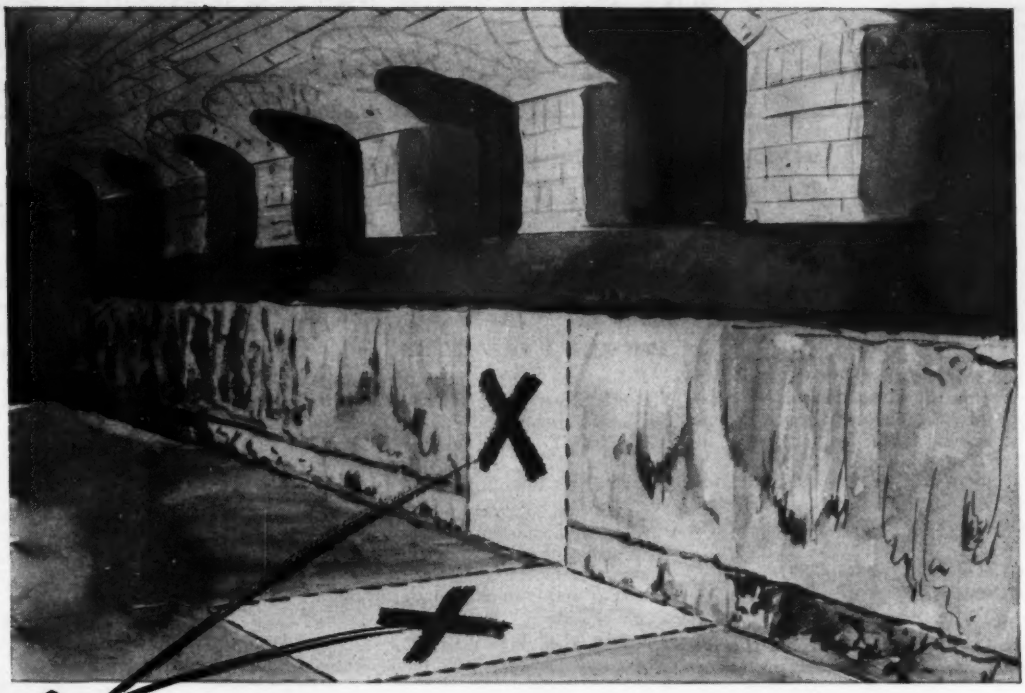
Stocks on hand at the close of June 1953 were 10,261,051 gross. This is 3.5 per cent higher than the 9,909,242 gross on hand at the close of May, and 1.9 per cent higher than the 10,060,049 gross on hand at the end of June 1952.

Correction: The Bureau of Census has released corrected figures in the breakdowns for Beverages, Returnable and Beverages, Non-returnable starting with March 1953. These corrections cover Shipments, Production, and Stocks and are as follows:

	Shipments	Production	Stocks
	(All Figures in Gross)		
Beverages, Returnable			
March 1953	776,420	858,631	1,149,140
April 1953	957,548	1,039,964	1,181,898
May 1953	1,065,768	1,032,864	1,098,691
Beverages, Non-returnable			
March 1953	51,421	44,095	70,152
April 1953	75,610	77,339	71,580
May 1953	83,408	92,500	82,141

Automatic tumbler production during May 1953 was 6,049,345 dozens. This is .3 per cent higher than the 6,028,661 dozens produced during April. During May 1952 production was 4,536,844 dozens. Shipments during May 1953 were 5,950,792 dozens, which is 1.1 per cent higher than the 5,885,676 dozens shipped during April. Shipments during May 1952 were 5,329,111 dozens. Stocks on hand at the end of May 1953 were

(*Continued on page* 461)



X MARKS THE SPOT...

WHERE YOU NEED MULLIFLUX TANK BLOCKS

As an added convenience, distinctive markings on each block readily identify Cast Mulliflux: "B" for Bottoms, "S" for Sidewalls.

If you have an unusual refractory problem, if you have difficulty in reaching and maintaining desired refractory service life, if you have *any* glass house refractory problem at all, it will pay you to investigate the outstanding properties of new Walsh Mulliflux Tank Blocks for sidewalls and bottoms of modern glass melting furnaces. Always the right answer to the need for lower cost per ton of glass melted. Mulliflux represents a supreme achievement based on over 50 years experience in developing glass house refractories that yield maximum life and economy. Before you rebuild, investigate the unique properties of Walsh Mulliflux tank blocks. Write for details.

Each time-tested Walsh product for the glass industry is an investment in greater production . . . lower cost . . . result of better Walsh research and ceramic engineering.

OTHER WALSH PRODUCTS FOR THE GLASS INDUSTRY

Missouri-Quality Fire Brick

Walsh Mullitex, super duty. Dry press process. Tunnel kiln burned.

Walsh Mullitex H B ("high burn") special super duty. Dry press process. Tunnel kiln burned. 100% Missouri clays.

Cast Sillimanite Refractory

Walsh CSR. For safer, longer lasting protection in glass tank upperstructures.

Walsh CSR (Fortified). For extra life in upperstructure "tough spots". P. C. E. Cone 39 (3389 deg. F.)

. . . also Cast-Flux, Vacuum Cast Tank Blocks; Debiteuse; Refractory, Upper Structure Grade; Floaters, Channels, Feeder Parts; Pot Furnace Refractories; Prepared Clays and High Temperature Cements.

WALSH
REFRACTORIES CORPORATION
ST. LOUIS, MISSOURI, U.S.A.

101 Ferry Street • St. Louis 7, Mo.
Factories: St. Louis, Missouri and Vandalia, Missouri
For Over 50 Years Manufacturers of High Grade Refractories

New Equipment and Supplies

FISHER-KENDALL MIXER

Fisher Scientific Company, 717 Forbes Street, Pittsburgh 19, Pa., has introduced its new Fisher-Kendall mixer.

The mixer has two arms mounted to rotate 180° out of phase with each other. Each arm has a cast aluminum "hand" mounted at an acute angle so that when the arms revolve, the sample is (1) slid and (2) thrown back and forth along the jar's length, and also (3) up and down as the jar revolves. Set-screws on each of the three fingers on each hand keep the jar firmly in position; suction cups on each finger insure tight grip. Either arm, or both arms, can be loaded; no need to counterbalance.

"PACKAGED" PROCESS CONTROLS

Minneapolis - Honeywell Regulator Company, Industrial Division, Philadelphia, Pa., has announced the introduction of a series of individually engineered control systems as "packaged" units to provide automatic control of various process operations.

The "packaged" units will be developed to take advantage of the uniformity among many process operations. Each unit, to be specially engineered for the specific process operation, will include recording and controlling instruments, measuring and control elements, and related accessories. Complete instructions will be provided to facilitate their installation without benefit of specialized skills.

THERMO ELECTRONIC RECORDER

Thermo Electric Company, Inc., Fair Lawn, New Jersey, has introduced a new recorder into its line of temperature measuring instruments. Both potentiometer pyrometer and resistance thermometer bridge types are available, depending on the application.

For temperature, the recorder is made in a number of different ranges from —100° to +3000°F. The instrument is suitable also for recording humidity, solution conductivity, speed, pH, D.C. current or voltage, power, strain, or other types of measurements that can be concerted to a change in resistance or D.C. millivoltage.

The instrument records on a 12" circular chart and indicates on a large circular dial with pointer clearly visible at 50 feet.

MULTIPLEXING EQUIPMENT

The Bristol Company, Waterbury, Conn., has announced a new multiplexing transmitting and receiving system for use with the company's Metameter Telemeters.

With this equipment, up to 15 readings (either pressure, vacuum, water or liquid, flow, temperature, static and differential pressure, motion, voltage, current, and totalized load) taken at separate locations or areas can be transmitted any distance to Metameter receiving instruments over a single circuit.

POCKET PYROMETER

Cybertronic Corporation of America, 136 8th Street, Dept., Upland, Chester, Pa., has announced its Cybertronic Model 240-T pocket pyrometer which measures 3⅞" x 3½" x 1¾" and has a 2.4" direct reading indicator scale.

Quick and accurate measurement of surface and sub-surface temperatures is possible through the use of interchangeable thermocouples. This pyrometer is available in five standard ranges.

CATALOGS RECEIVED

Hauck Manufacturing Company, 124 Tenth Street, Brooklyn 15, New York, has published its third edition of "Hauck Industrial Combustion Data."

A handbook consisting of 168 pages on industrial heat processing applications, it will be of interest to those concerned with the selection, supervision, operation, and maintenance of oil and gas combustion equipment as applied to industrial furnaces, ovens, kilns, driers, heaters, kettles, and similar equipment. Useful technical data is arranged in concise and practical form, and amply illustrated.

Also announced by this company is a new 28-page Foundry Equipment Catalog which is an easy-to-use guide in the selection of oil or gas burners, torches or heaters, including many new units. Highlights of the catalog include discussions of equipment to improve operations on ladle heating, mold drying, preheating electric furnace linings, core baking, fire melting and annealing furnaces, etc.

General Electric Lamp Division, Inquiry Bureau, Nela Park, Cleveland 12, Ohio, has issued a new publication, "Group Lamp Replacement Pays Off," pointing out that group replacement of lamps in factories, offices, and stores before burnout pays off by providing better lighting at lower cost.

The 10-page publication features nontechnical descriptions of lamp group replacement plans currently in effect and outlines their benefits. It describes and illustrates group replacement practices now in use, and lists important benefits in the form of lower labor costs, fewer interruptions of personnel, longer performance of auxiliary equipment, higher lighting levels, greater efficiency of workers, and lower accident rates.

Eisler Engineering Company, Inc., 750 South 13th Street, Newark 3, New Jersey, is distributing a catalog, "Equipment Required to 'Re-New' Burned Out Television Tubes."

Containing 8 pages and 70 illustrations, the catalog illustrates the equipment necessary to renew burned out TV tubes and goes on to discuss and illustrate the various kinds of equipment for television tube manufacture.

The Robinson Clay Product Company, Akron, Ohio, has announced the release of a new, illustrated 24-page catalog describing its complete line of pottery, china, and glass.

Bound in an attractive cover, the new catalog includes eight pages of domestic and imported glass and dinner ware in full color. The catalog also covers nationally-known Libbey fine glassware, Pyrex ovenware and flameware, and numerous dinnerware lines.

Hardinge Company, Inc., York, Pa., has just published a new 12-page catalog on regulating type feeders, Bulletin 33-E.

The catalog covers design details, capacities, dimensions, and application of Hardinge constant-weight feeders, weight-measuring feeders, volumetric belt feeders, disc feeders, and volumetric non-flooding drum feeders. These feeders are used to control the rate of withdrawal of materials from bins or hoppers and discharge them to conveyors or subsequent processing equipment.

Brockway Glass Company, Inc., Brockway, Pa., has issued a new catalog describing its stock lines of Temperglas containers, of particular interest to the pharmaceutical field.

Included is a data sheet featuring standard finishes; another giving conversion tables. Sheets are included in the various glass containers produced by Brockway, with vital statistics pertaining to each.

Libbey-Owens-Ford Glass Company, Fiber Glass Division, Nicholas Building, Toledo 3, Ohio, has announced a new folder giving technical data on fiber glass yarns for electrical insulation.

The folder contains complete information on standard packaging, yarn specifications, and data on thermal conductivity, heat and acid resistance, moisture absorption, insulation resistance, dielectric strength, and cites numerous specific applications.

Dravo Corporation, 1203 Dravo Building, Pittsburgh 22, Pa., has released Bulletin 560-52 explaining how combination oil- and gas-fired industrial space heaters are used for comfort heating and to supply heat for process drying of vitreous ware.

When you attend the

Lynch-Overmyer Clinic

...here are some of the scenes you'll see at Overmyer

All of us at Winchester, Indiana are looking forward to greeting many old and new friends at the Lynch-Overmyer Clinic on September 23. We'll try to make it a worthwhile occasion. You'll hear of advances in mould irons. You'll see mould equipment manufactured from specially formulated metals in the foundry to finished product on the shipping dock. You'll join in profitable discussion on problems of interest to all of us. When you receive your invitation, return the reservation card at once . . . we'll try to show you that our welcome mat means what it says.

Pattern Department

Foundry Department

Lathe Department

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A PART IN THE PROGRESS OF GLASS

MOULD COMPANY, INC.

General Offices, Main Plant and Foundry Division: Winchester, Indiana

Eastern Plant: Greensburg, Pennsylvania • *Western Plant: South Gate, California*

KIMBLE ELECTS VICE PRESIDENT-GENERAL MANAGER

R. H. Mulford, a Vice President of Owens-Illinois Glass Company, has been elected Vice President and General Manager of Kimble Glass Company, a subsidiary, it has been announced. Mr. Mulford, formerly Director of Owens - Illinois' Department of Personnel Administration, succeeds S. J. McGiveran, whose new responsibilities will be announced at a later date.

Mr. Mulford will report to C. R. Megowen, President of Owens-Illinois and Chairman and President of Kimble Glass. In his new capacity, Mr. Mulford will be responsible for the production and sales of all Kimble Glass Company products, including television bulbs, Insulux glass block, specialty glass containers, laboratory glassware, glass tubing and rod, glass insulators, and miscellaneous pressed glass articles.

Associated with Owens-Illinois since 1933, Mr. Mulford has served as Plant Manager at the Los Angeles and Oakland plants before becoming General Factories Manager of the Pacific Coast Division in 1946. He transferred to Toledo in 1949 when he was elected a Vice President and appointed to head the Department of Personnel Administration.

COLUMBIA-SOUTHERN APPOINTMENT

The appointment of Brooks M. Dyer as Assistant Director of Sales for Columbia-Southern Chemical Corporation has been announced by W. I. Galliher, Vice President.

Associated since 1943 with Columbia-Southern, a wholly-owned subsidiary of Pittsburgh Plate Glass Company, Mr. Dyer previously served as District Sales Manager at St. Louis and as Assistant District Sales Manager at Philadelphia.

William Carpenter, sales representative at St. Louis, has been appointed acting District Sales Manager at St. Louis.

MARIETTA CONCRETE BALTIMORE PLANT IN OPERATION

Full scale production of Marietta insulated precast concrete wall panels is now underway at the new Baltimore plant of The Marietta Concrete Corporation, according to a recent announcement.

The $150,000 plant was started shortly after the first of the year to add panel production to the existing facilities for manufacturing concrete products at the Baltimore branch.

O-I CLARION PLANT SETS SAFETY RECORD

Until an accident injuring two men spoiled it, the Owens-Illinois Glass Company's Clarion plant had worked over four years and nearly 4¾ million man hours without a lost-time accident. This is a new record for glass container plants in the National Safety Council.

NEW GLASS SEAL THERMOPANE INSULATING WINDOW

The development of a new glass seal Thermopane insulating window unit by Libbey-Owens-Ford Glass Company is the culmination of many years of research and may prove to be a production answer to the rapidly growing demand for insulating glass for all-around glazing of homes, factories, schools, laboratories, and other buildings.

According to G. P. MacNichol, Jr., President, the new glass seal Thermopane unit will be manufactured in the smaller standard sizes beginning with the 45½ by 25½-inch size now popular in the panel awning type of window. It will be made of double strength high quality window glass with an air space of 3/16-inch between the lights, which will be blended into a smooth, fire polished edge. This edge makes the unit easy to glaze with weather-tight seal into the many types of standard-sized wood and metal sash now manufactured for Thermopane glazing.

During manufacture, the air between the two panes of glass is completely withdrawn and replaced by clean, dry air so as to minimize condensation in the air space under changing weather and temperature conditions.

NEW NORTON DEPARTMENT

To further advance improvement of product performance in the metals industry through greater use of precisely lapped parts, Norton Company's Grinding Machine Division has announced the establishment of the Norton Job Lapping Department.

• American Gas Furnace Company has granted additional territory in New York State to the southeastern New York representative, Hornbruch Associates of Scotch Plains, New Jersey.

30 Years Service to the INDUSTRY by TECO

Announcement—

To the Glass Industry, that Mr. Batchell and Mr. Bergman under the firm name of "The Toledo Engineering Co." as Engineers and Contractors are in a position to serve the Glass Manufacturers, be it a complete plant or repair.. With our modern Block Dressing Machine in connection with our Block Setting Machine appliances, we will be able to reduce your cost of construction.

Consult us and let one of our Engineers go over your problems with you.

Toledo Engineering Company

Box 6, Station G — TOLEDO, OHIO

The announcement of the formation of Toledo Engineering Company which appeared 30 years ago.

WE wish to take this occasion to express sincere appreciation for

30 YEARS OF PROGRESS

in expansion of service—in the calibre and number of clients—in the volume of service rendered. And we pledge our sincere efforts to merit continuation of this success.

TOLEDO ENGINEERING Company

GLASS MELTING AND MANUFACTURING EQUIPMENT

958 Wall St. TOLEDO, O.

FIRST ISSUE OF TOLEDO BLADE SEALED IN GLASS

A copy of the first edition of the Toledo Blade, dated December 19, 1835, was found recently and is the only first edition known to exist. Anxious to preserve the single four-page sheet, the Blade asked Libbey-Owens-Ford Glass Company to seal the newspaper in glass.

The newspaper, in unusually good condition, was sandwiched between two sheets of plastic, polyvinyl butyral, which is also used in safety glass manufacture, and these in turn were sandwiched between two pieces of polished plate glass. The glass, made of special materials to give high light transmittance, was semi-tempered to give it added resistance to breakage.

The unit was put in a Cellophane bag from which all possible air was removed. It was then placed in an autoclave at the company's East Toledo plant, where hot oil under pressure bonded the entire unit together in the same manner that safety glass is made. The company's Design Department fashioned a special case to hold the laminated unit. It is set in a brass frame which is tilted for easy viewing. The frame is pivoted so that it can be turned over to reveal the other side by releasing a latch.

NYOTEX CHEMICAL NAMES EXECUTIVE VICE PRESIDENT

The appointment of C. W. Mitchell as Executive Vice President of Nyotex Chemical Company has been announced by G. L. Bond, President of Consolidated Chemical Industries, Inc.

Mr. Mitchell spent 17 years with the Missouri Pacific Railroad and has been with Consolidated Chemical for 24 years. He was Vice President of Nyotex prior to his appointment. Nyotex Chemical Company is a mutually owned subsidiary of Consolidated Chemical Industries, Inc., Stauffer Chemical Company, and Harshaw Chemical Company.

• Canadian Pittsburgh Industries Limited has started construction in Montreal of what will be Canada's largest glass warehouse when completed. It will be over 85,000 sq. ft. and will also house a mirror manufacturing plant and safety glass depot for automotive dealers. It will cost over $1,000,000 when completed.

An announcement by

A.-B. ORREFORS GLASBRUK

In our brochure "Orrefors Lighting Fixtures", published toward the end of 1948, it was stated on page 3 that we owned the patent and exclusive rights all over the world of so-called double-corrugated glass. This is not the fact, however, and we very much regret that owing to an oversight it was allowed to stand uncorrected in the brochure.

Through an agreement between Orrefors and Dr. Fredrik Kurz, Nysätravägen 12, Lidingö, Sweden, we have acquired the rights concerning double-corrugated glass in Sweden (Patent No. 123583), Denmark (Patent No. 73896), Norway (Patent No. 79554), and Great Britain (Patent No. 563658), while Dr. Kurz owns the patent rights in all other countries. We are nevertheless entitled to export to all countries articles manufactured by Orrefors, which fall under the protection — technical but not territorial — of this patent.

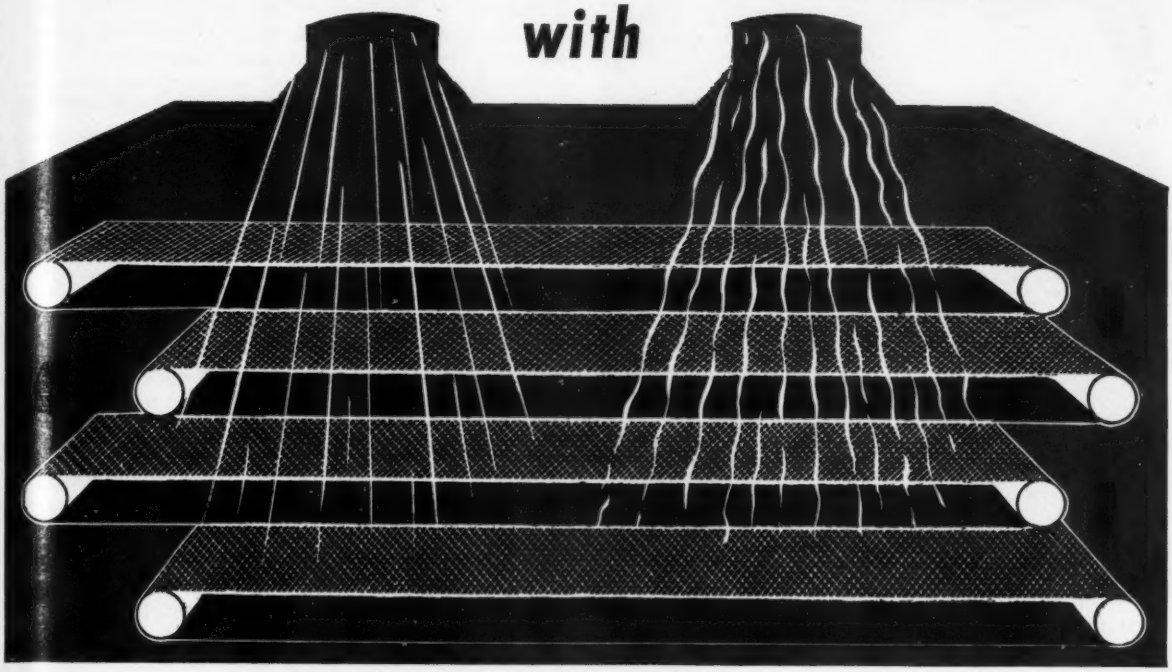
The number of the patent which covers the manufacture of double-corrugated glass in the United States is 2610444.

We confirm at the same time that we have not on record that we own any rights whatever concerning Dr. Kurz other patents.

A.-B. ORREFORS GLASBRUK
ORREFORS, SWEDEN
JOHAN BEYER

SAVE TIME...SAVE MONEY

on air cooling or air drying jobs with



WISSCO STEEL PROCESSING BELTS

If your processing involves air cooling or air drying, it will pay you to investigate the big savings Wissco Belts can give you by converting time-consuming batch operations into fast, efficient, continuous straight-line production.

With Wissco Belts you get these advantages:

- **Maximum air circulation either hot or cold, any velocity or volume, because of wide open balanced spiral weave.**
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- **High loading capacity because of strong, steel construction.**
- **Simple, low-cost installation; and economy of continuous straight-line operation.**

To order, write or call our sales office at 56 Sterling St., Clinton, Mass., or contact our nearest district office.

THE COLORADO FUEL AND IRON CORPORATION—Denver, Colorado
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WISSCO BELTS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CFI

Nell Jaffe, assistant to the Director of the Toledo Museum of Art, holds a rare 135-year old bowl which is one of the nine pieces of early American glassware acquired by the Museum.

TOLEDO MUSEUM ADDS TO GLASS COLLECTION

The Toledo Museum of Art has announced the acquisition of nine pieces of rare early American glassware for its permanent collection. Produced about 135 years ago by the New England Glass Company of Boston, the items were placed on exhibition in July.

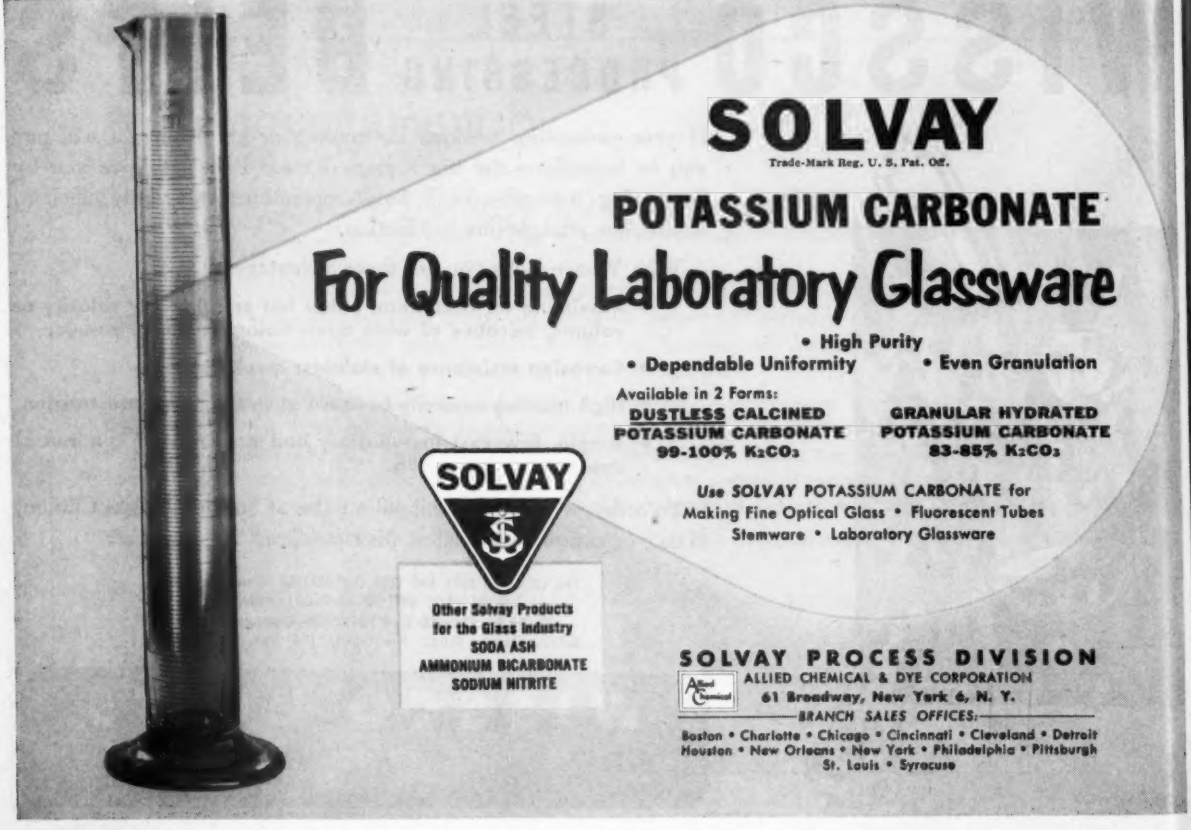
In the group is a complete set of eight pieces, including a sugar bowl, four salt cups, and three shallow bowls, all of different shapes. The set was acquired from the collection of Lura Woodside Watkins, noted collector and author of the first book on New England glass. The ornamented pieces were blown in full-sized molds.

The ninth newly-acquired piece is a covered sugar bowl made of clear flint glass. It is 10 inches high and weighs more than two pounds.

KAISER APPOINTMENTS

The appointments of Russel T. Drennan and Joseph A. Voss, Jr. as Eastern Sales Manager and Assistant Eastern Sales Manager, respectively, of the Chemical Division of Kaiser Aluminum & Chemical Sales, Inc., have been announced by Frank M. Cashin, Chemical Division Manager.

Prior to his appointment, Mr. Drennan was District Sales Manager with supervision over sales and development of the Division's complete line of basic refractory brick, mixes, and mortars along the Atlantic seaboard. He was with Kaiser Aluminum at the Baton Rouge, Louisiana plant before joining the chemical sales organization.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POTASSIUM CARBONATE
For Quality Laboratory Glassware
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Available in 2 Forms:
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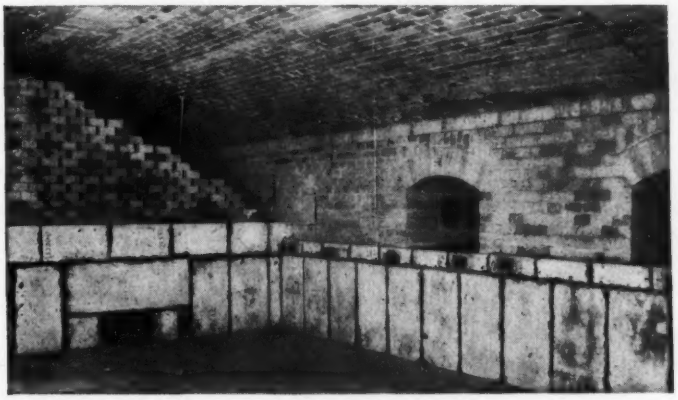
The trend is to MONOFRAX®

FUSED CAST *refractories*

This is a 3-port, gas-fired borosilicate tank. MONOFRAX MH refractories are used in the melting and refining end sidewalls, throat, doghouse feeder and mantle blocks, port bottoms, tuckstones, feeder entrances and bridge cover runner blocks. From previous experience with Type MH, this operator believes that aside from the requisite purity it will give lowest refractory cost per ton of glass packed.



Above information and photo courtesy Thatcher Glass Manufacturing Company, Inc., McKee Division

WHERE PURITY IS IMPORTANT the composition of your glasshouse refractories is critical. A relatively small percentage of impurities can result in a large number of glass defects. A little too high a percentage of glassy matrix and you get contamination by streaks of glass of differing density — hence, an unstable glass. A trace of this element or that and you get color. In short, for the tank proper you need the *purest refractory available.* That product is MONOFRAX MH fused cast refractories. Consisting of over 98% alumina — and with less than 0.07% impurities — these refractories are ideal for the entire melting and refining end sidewalls. Or, for *any area* in a continuous tank where there is likely to be severe corrosion. This is particularly true if glass quality is important.

HOW TO STRENGTHEN crown weakness and keep erosive silica drip from breastwalls has been neatly solved by several tank operators. They installed MONOFRAX H blocks in the crown skews and adjoining crown section of the melter back end area. This serves as an effective roadblock for silica drip that still may occur from the crown.

CARBORUNDUM
Registered Trade Mark
Dept. L-83, Refractories Div.
The Carborundum Company, Perth Amboy, N. J.

INVENTIONS AND INVENTORS . . .
(*Continued from page* 434)

the joint between the two halves of heater 16, represented by covers 17 and 18, causes no appreciable irregularity in heating.

The radiant heating saves time since glass pipe may be heated at a high rate by the diffuse heat from a radiant heater which is at a very much higher temperature than that of the pipe. If conduction heating were employed with a heating element in more or less firm contact with the glass pipe, hot spots in the glass pipe would cause breakage. Advantage of radiant heating also becomes effective during the annealing of the glass pipe after bending.

The patent contains 7 claims and the following references were cited: 1,147,396, Hawley et al., July 20, 1915; 1,426,187, Harrison, Aug. 15, 1922; 1,864,666, Osborne, June 28, 1932; 2,135,775, Walker, Nov. 8, 1938; and 2,426,976, Taulman, Sept. 2, 1947.

Method of Mounting Vacuum Tube Electrodes. Fig. 10. Patent No. 2,635,391. Filed July 2, 1951. Issued April 21, 1953. One sheet of drawings. Assigned to Farnsworth Research Corporation by Sanford F. Essig.

This invention relates to methods of mounting vacuum tube electrodes and more particularly to methods of mounting electrode assemblies within glass envelopes for providing external connections through such glass envelopes. The method of mounting is illustrated in Fig. 10.

While the glass portion adjacent to rod 3 is still soft, a tool 6 is depressed over the end of rod 3 causing the rod to pierce the glass wall. The operation also strips the glass film from the exposed portion of the rod. The end of rod 3 enters an opening 7 in tool 6 so that lead-out rod 3 extends externally of the envelope. Thus the electrode may be positioned precisely as it should be within the envelope, and the lead-out seal is made without disturbing the precise positioning of the electrode elements. To facilitate the collapse of the wall about the rod 3, the interior of the envelope may be partially evacuated so that the external air pressure will tend to push in the softened glass about the electrode rod.

The patent contains five claims and the following references were cited: 1,293,441, Housekeeper, Feb. 4, 1919; 2,340,459, Eitel, Feb. 1, 1944; and 2,482,119, Mickley, Sept. 20, 1949.

Take-out Device for Glass Blowing Machines. Fig. 11. Patent No. 2,634,552. Filed January 10, 1949. Issued April 14, 1953. Two sheets of drawings. Assigned to Fairmount Glass Works, Inc. by John L. Woolling.

A novel transfer device is shown for removing the finished bottle from a machine. This apparatus enables a bottlemaking machine to be operated at speeds greater than those heretofore deemed practicable.

The transfer mechanism shown in Fig. 11 comprises a vertical shaft 20 rotatably supported at one side of the mold table from upper and lower arms 21 and 22 which project outwardly from the frame of the machine. Intermediate its length, the shaft 20 has secured to it a spider 23 having at least three, and preferably four, arms each of which supports at its outer end a bottle-carrying head. Each of such heads comprises a bottle-clamp 25 to grip the neck of a bottle 26. In the particular pneumatic mechanism shown, each cylinder 27 is arranged vertically, and the piston 28 moves upwardly to close the clamp 25 and downwardly to open it. The shaft 20 is operated jointly with the mold table 10 so as to rotate intermittently and bring the several heads 24 successively into association with the mold table at the take-out station.

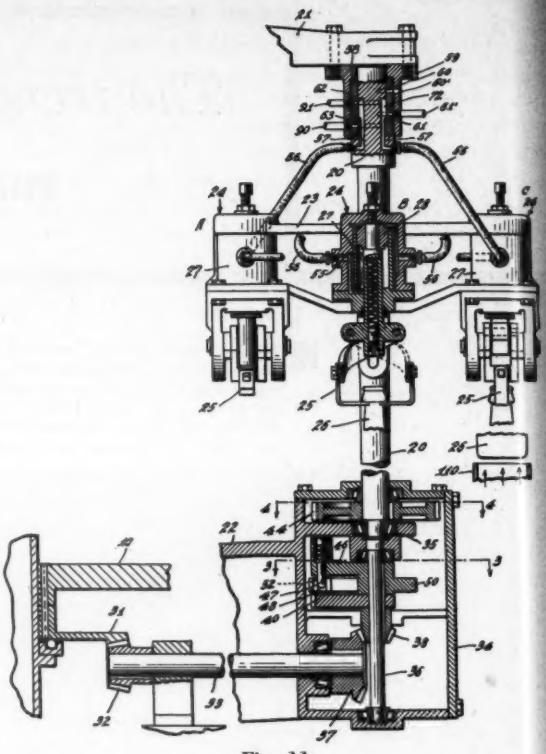


Fig. 11.

The patent contains five claims and 13 references were cited.

THATCHER HELPS IN POLIO INOCULATION DISTRIBUTION

Franklin B. Pollock, President of Thatcher Glass Manufacturing Company, Inc., placed the company aircraft at the disposal of City Health Officer Dr. Charles Dale during the current polio epidemic in and around Elmira, New York.

Chemung County, in which Elmira is located, and neighboring Steuben County were the scene of history's largest anti-polio inoculation on July 11 and 12 when 34,901 children under 10 years of age received Gamma Globulin injections. The day before the inoculations were to take place, Dr. Dale called upon the Thatcher plane to fly to Binghamton to pick up fifteen cases of syringes needed for injections.

On arrival at Binghamton, J. S. "Torch" Lewis, Thatcher pilot, learned that the commercial airline scheduled to deliver the material to Binghamton had relegated the vital shipment to the second section of their afternoon flight. To save precious hours, the Thatcher craft flew on to New York City and returned directly to the Chemung County Airport with the shipment.

• Indiana Glass Company's president, Charles L. Gaunt, has announced the appointment of C. J. Phillips as Vice President and Assistant General Manager.

Proved through the years

Time is the test of dependability. Behind Nialk Chemicals are more than fifty years of experience in meeting strict specifications.

a typical example...

NIALK CARBONATE OF POTASH: Fine lenses call for glass of utmost clarity. That's why so many makers of optical glass use pure, uniform NIALK Carbonate of Potash as their flux—and have for years.

The quality of this and other NIALK chemicals—today as in the past—is the result of broad research, strict quality control and a knowledge of the needs of industry.

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CAUSTIC POTASH
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TRICHLORethylene

NIAGATHAL (TETRACHLORO PHTHALIC ANHYDRIDE)

GLASS BATCHING . . .
(*Continued on page* 420)

doors have glass panels added which enables the maintenance people to look in without opening the doors and exposing the relays, electric eyes, etc. This plant has both a passenger and a freight elevator. The management of this plant is justly proud of the excellent job this batching system is doing for them.

Plant "E" is the largest of the batching systems mentioned thus far and is designed to weigh, assemble, mix, and deliver batch to the furnaces automatically, all of which it does now, except delivering to the furnaces automatically. The structural portion of the delivery system is yet to be built, but will be in the near future.

The plan of this batching plant has ten storage bins, two of which have a partition in them, with an opening in the partition at the bottom, thus allowing them to be used as single bins. However, should a need for additional bins arise, the opening in the partition can be closed and provisions have been made for attaching additional vibrating feeders at the spare bin bottoms.

The scales, which are fed by vibrating feeders, are located immediately under the silos; the assembly belt and scale discharge feeders are located in the basement below the scale floor. The assembled material elevator, surge hopper, and check scale, along with the mixers, are located in the mixer building adjacent and connected to the silos.

Two mixers are located on the third floor of the mixer building; one is for standby purposes only. Above the mixers is a surge hopper that will hold the entire assembled batch. This hopper is mounted on a scale which check-weighs the entire batch before it is dumped into the mixer. Should the total weight be plus or minus more than the allowed tolerance, the system will lock it out until adjustments are made.

Another feature of this plant is the fact that any bin can be emptied and spouted back into a railroad car or a truck without going through the mixer.

Also of interest is the system of checking each batch for contents by the use of an Esterline-Angus continuous chart impulse recorder. It tells when each material goes in, about how long it takes it, when each scale discharges, when the surge hopper is satisfied, when the batch goes into the mixer, and how long it runs, etc. This is one of the most satisfying features of the completely closed system, where you have no way of knowing what happened after it happened. This is the idea and application of the plant's own engineers.

In the unloading area four cars can be spotted over the undertrack hoppers at one time and two different kinds of material can be unloaded at the same time. The distributor spout in the head house is another unusual feature, too.

There is the question of getting a material in the wrong bin in any batching plant. Each plant has its own dubious system designed to prevent it.

This batching system has been most satisfactory to the management of the plant up to date, and will be even more so when the batch delivery system is completed.

Each of the foregoing illustrations of actual batching plants are different and not one of them would be suitable for the other's use, and yet each one is adequate for its particular job.

It goes without saying that there have been some changes made in each of the plants mentioned above since they were built and if the people who built them were to build them over today, there would be many changes and improvements made. Nevertheless they are all doing a satisfactory job in their own field now.

The following are a few do's and don'ts:

(1) Damp cullet stored in a deep silo for several months without moving may cake up.

(2) Outside walls may be inclined to sweat at times; therefore, materials subject to caking should be put into interior cells or bins.

(3) Dust is hard on scales and electric contacts; use glass enclosed relays, etc.

(4) Moisture below grade is a problem in certain areas.

(5) Vibration from mixers may affect scales, etc., if they are not substantially mounted and properly balanced.

SAFETY COUNCIL REPORTS SAFEST YEAR

Workers employed by member companies of the National Safety Council had the safest year on record in 1952. They had fewer on-the-job accidents and the ones they had were less serious.

Industrial injury rates for last year show a substantial reduction in both frequency and severity of 1952 accidents compared with 1951. Thirty-one of the 40 basic industry classifications reduced their frequency rates and 25 reduced severity rates.

The average accident frequency rate for employees in all industries submitting company reports to the Council, based on the number of disabling injuries per 1,000,000 man-hours, was 8.40 in 1952, a reduction of 7 per cent from the year before.

CORNING GIVES TESTIMONIAL DINNER FOR BAUSCH & LOMB EXECUTIVES

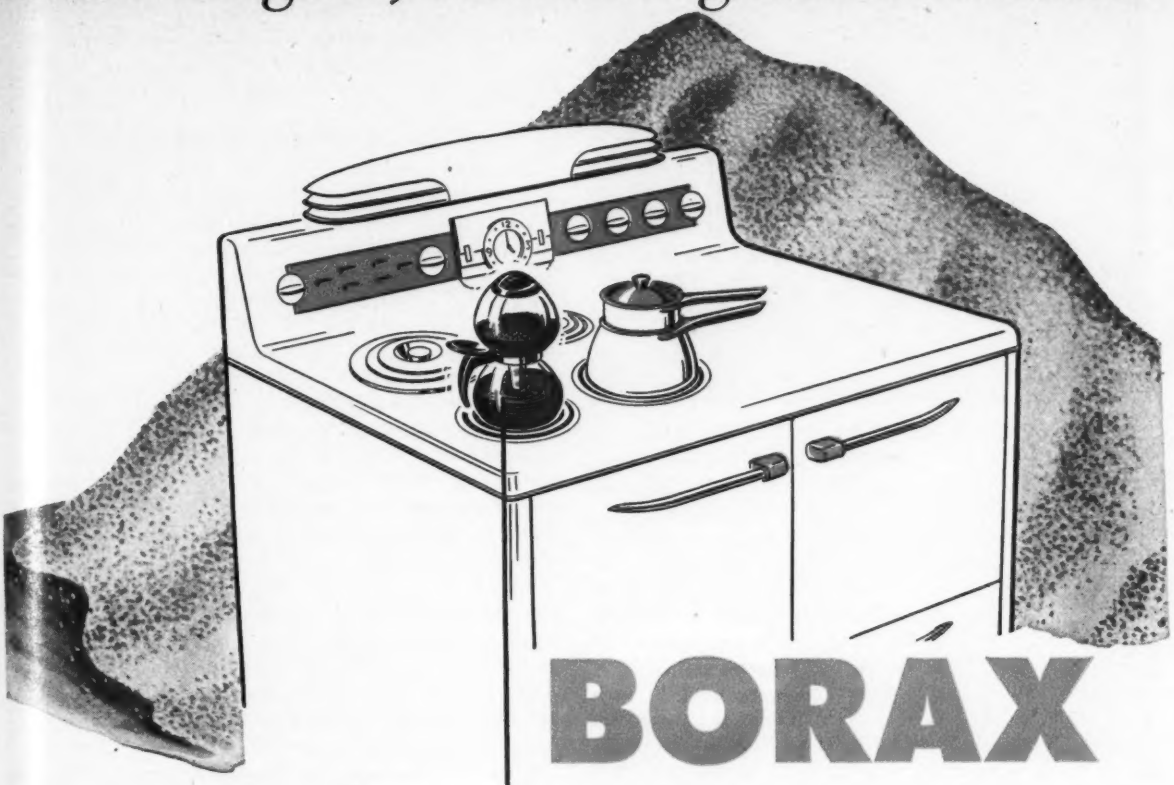
Four officials of the Bausch & Lomb Optical Company were honored by Corning Glass Works officials at a recent testimonial dinner at Corning Glass Center, marking the 100th anniversary of the world-renowned optical company.

Highlighting the affair was the presentation of an engraved Steuben crystal bowl by Corning's Board Chairman, Avery Houghton, to Joseph F. Taylor, President of Bausch & Lomb. The inscription on the bowl reads as follows: "Presented to Bausch & Lomb Optical Company, 1853-1953, by Corning Glass Works in recognition of a Century of Service to Science, Research, Industry."

Representing Bausch & Lomb, which has been a customer of Corning for the last 69 years, were Mr. Taylor; Carl S. Hallauer, Executive Vice President; Joseph W. Taylor, Secretary; and Carl A. Day, Vice President in Charge of Manufacturing.

• The Northern Ohio Section of the American Ceramic Society, in conjunction with the Canton Alliance Engineers Club, will hold its annual Golf Outing and Dinner at the Lake Forest Country Club, Hudson, Ohio, on September 11.

BEHIND *tougher, smoother glass & ceramics*



BORAX

THREE ELEPHANT* PRODUCTS

Borax, Technical (coarse, fine granular and powdered)
Boric Acid, Technical and U.S.P.
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TRONA† BRAND	ESTON BRAND
Lithium Chemicals	Aerosols
Muriate of Potash (chemical and agricultural grades)	Defoliants
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Salt Cake	Herbicides
Desiccated Sodium Sulphate	Insecticides
Soda Ash	Organic Bromides
Sodium Pentaborate	Refrigerants
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TRONA
INDUSTRIAL AND AGRICULTURAL CHEMICALS
ESTON CHEMICALS

BORAX with its fluxing ability, antiseptic properties and alkaline nature, finds innumerable uses from the glaze on dinnerware to the vitreous enamel on refrigerators, stoves and kitchen ware. It plays an important part in the production of heat resistant glassware where tough and durable qualities are essential.

For years BORAX has been employed extensively in the preparation of soap and cleaning compounds, but its applications go even further—into the field of metallurgical processes, the textile and cosmetic industries.

BORAX is one of the *basic* chemicals produced by American Potash and Chemical Corp. In its various raw and processed forms, it is available under the trade name "THREE ELEPHANT BRAND." Today, the trade recognizes that from American Potash & Chemical Corp. they may purchase Borax and Borax derivatives of the highest quality suited for every manufacturing requirement. If you use BORAX in any of its various forms, check your requirements with American Potash and Chemical Corporation.

PROVED CHEMICALS FOR INDUSTRY AND AGRICULTURE

American Potash & Chemical Corporation

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• ESTON CHEMICALS DIVISION
3100 East 26th Street, Los Angeles 23, California
Plants • Trona and Los Angeles, California

FIBERGLAS USED AS BOAT REPAIR

Large boats, as well as small ones, may be repaired and strengthened with Fiberglas reinforced plastic. This has been proved by Robert B. Kyle, owner of Catawba Marine Sales on Catawba Island, summer resort area on Lake Erie, who has just finished covering the hull of a 31-foot fishing cruiser with three laminations of Fiberglas cloth and resin. He has also replaced the canvas on the deck and cabin top of a 32-foot cruiser with one lamination, consisting of one layer of cloth and three of resin.

Thirty yards of Fiberglas cloth were used in each lamination, making a total of 90 yards for the entire project. The cloth is only .015 of an inch thick and the complete new covering of three laminations is only three-sixteenths of an inch thick. Total weight for the new covering is estimated at 120 pounds, about 12 per cent of the extra weight usually collected through water absorption. The resin was spread with paint brushes while the Fiberglas fabric was pressed on by hand and squeegees.

GLASS STAINLESS STEEL TANK

The first glassed stainless steel tank, designed to be super-corrosion resistant for storing fuming nitric acid, will be produced by the Pfaudler Company for the Air Force, according to that company's recent announcement.

The firm is manufacturing the 1,000-gallon tank for Holloman Air Force Base in New Mexico. It will be used to store highly volatile nitric acid for oxidizing jet fuel.

The new tank will eliminate the threat to airfield personnel which existed when the acid was stored in metal drums. The acid decomposed when in direct contact with the metal. High pressures built up in the drum with resultant constant danger of explosion. Decomposition at times diluted the solution to 50 or 60 per cent of its full strength, contaminating the acid and reducing oxidizing efficiency. The new tank will assure use of full strength nitric acid.

• D. M. Kerr, General Superintendent of the Chemical Division plants of Kaiser Aluminum & Chemical Corporation, has been elected to the 1953 Board of Directors of the National Lime Association. Mr. Kerr will represent the 15th District, which includes California, Nevada, Utah, Arizona, Colorado, and New Mexico.

and here's how...

Due to its superior fluxing qualities, Borax will tend to reduce your batch melting time . . . while enabling you to produce a bottle with fewer checks.

Write to Stauffer's Technical Sales Division for more information about F. M. Smith Brand Borax and the way it can increase your pack and reduce production costs.

Sulphurs — Nitrate of Potash

Stauffer CHEMICALS SINCE 1885

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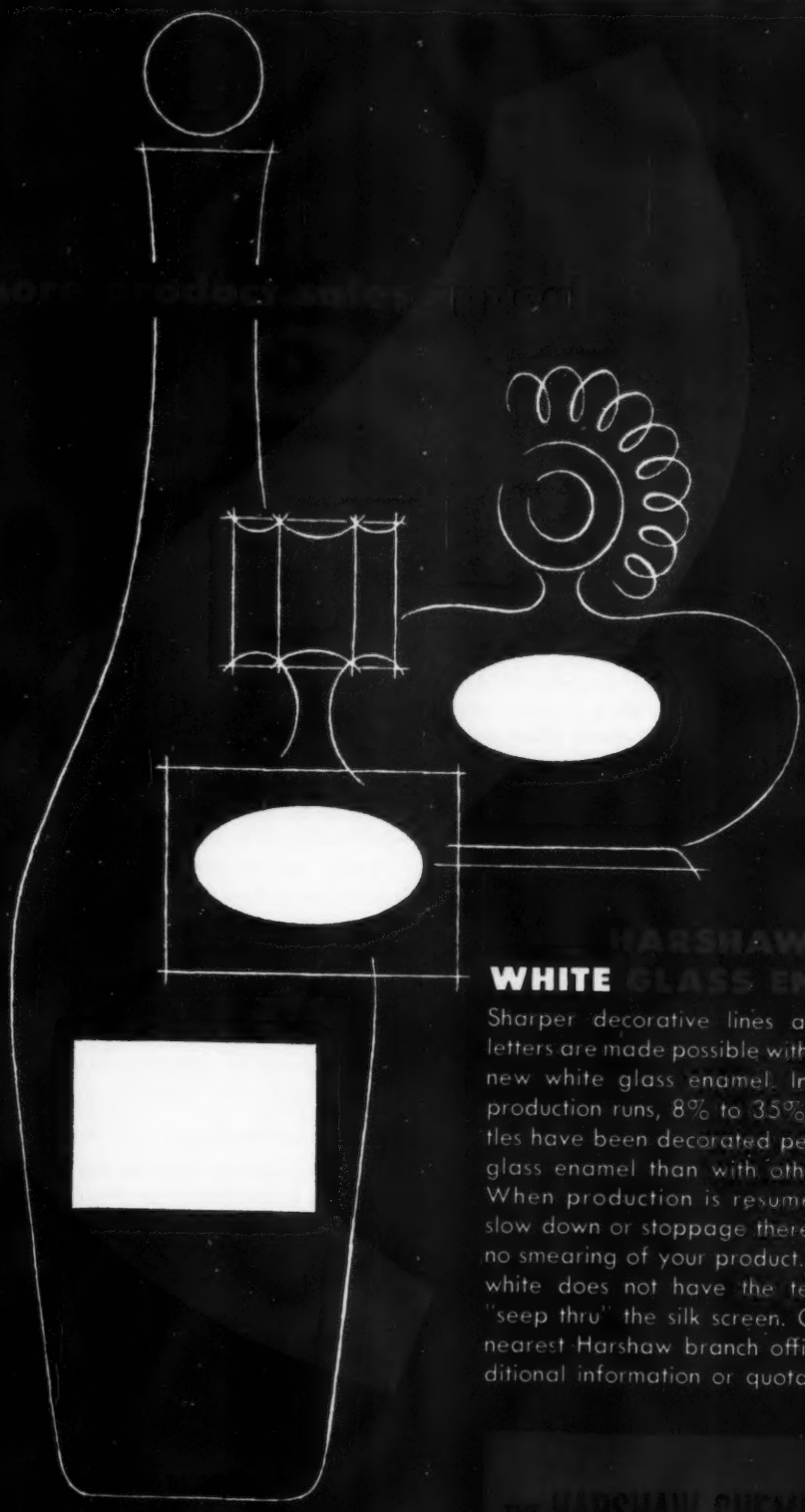


WHITE

Sharper decorative lines and smaller letters are made possible with Harshaw's new white glass enamel. In impartial production runs, 8% to 35% more bottles have been decorated per pound of glass enamel than with other brands. When production is resumed after a slow down or stoppage there is little or no smearing of your product. Harshaw's white does not have the tendency to "seep thru" the silk screen. Contact the nearest Harshaw branch office for additional information or quotation.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

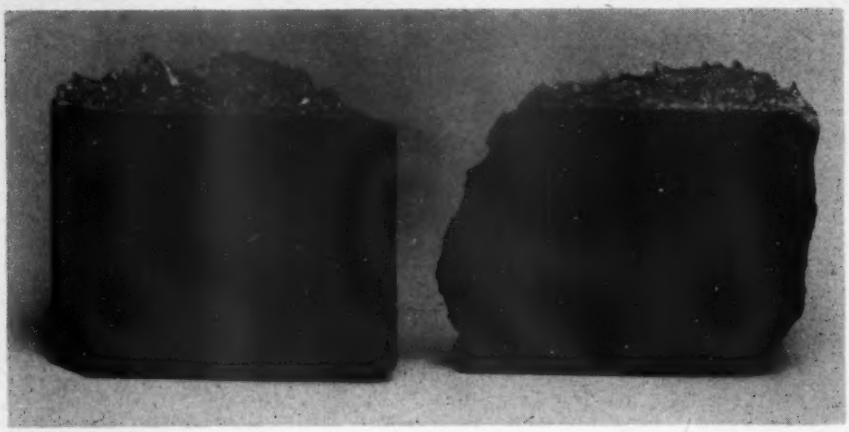


Figure 4. Specimens from two refractory clay pots that have been used for melting optical glass. In the specimen at the right, the molten glass has penetrated extensively into the body of the pot, as indicated by the difference in shading. The specimen at the left shows none of this difficulty. NBS measurements indicate that high permeability of the pot to air is associated with high penetrability by molten glass.

that it flows through the brick and out into the room at the opposite face. The other four faces are sealed with a soft rubber inner tube inflated with sufficient pressure to prevent air from escaping. The rate of air flow through the brick and the pressure difference between the two non-sealed faces are measured, and from these data the permeability is readily calculated.

The air supply is furnished by a compressor. After passing through a trap and filter, three pressure regulators, and two drying towers, the air enters a flow meter. This device consists of one or more capillary tubes connected across a kerosene manometer. With proper calibration, the pressure difference between the ends of the capillaries, as indicated by the manometer, gives the rate of flow. From the flow meter the air enters the top of the seal box containing the test brick. Pressure difference between the top and bottom surfaces of the brick is indicated by two low-range pressure gages and a higher-range manometer, all connected to the top of the seal box. Flow rates per unit pressure drop across specimens have been accurately determined for a range from 0.00114 to 542 units with this permeameter.

Permeabilities were determined for some eleven types of firebricks: insulating, super-duty fire-clay, high-duty fire-clay, mullite, acid-proof, silica, magnesite, chrome-magnesite, magnesite-chrome, kaolin, and 60 per cent alumina. Permeability was generally lower flatwise than edgewise or endwise, probably because most of the firebricks were made by the dry press process. Correlation between permeability and the other determined properties was low, but there was some tendency for higher permeability to be associated with higher porosity and with lower bulk density and modulus of elasticity. Specimens of some unburned bricks with organic binders were measured both before and after heat treatment. Their permeability was greatly increased by 1600°C. heat treatment. Permeability was much more sensitive to heat treatment than were porosity, bulk density, and modulus of elasticity.

Similar measurements were made on specimens cut from three slip-cast refractory-clay pots of the type used for making optical glass. Pots that in service showed high resistance to penetration by molten glass were found to be characterized by fine grain sizes and low permeability; high measured permeability was associated with high penetrability by molten glass. Permeability was a better criterion for resistance to attack by molten glass than was modulus of elasticity, porosity, or bulk density.

PENNSALT DISTRICT MANAGER NAMED

James G. Baldwin has been appointed District Sales Manager in charge of the Los Angeles office of the Pennsylvania Salt Manufacturing Company, it has been announced by L. M. Shanaman, Heavy Chemicals Sales Manager. Mr. Baldwin will be in charge of heavy chemicals in the California area.

Since starting with Pennsalt in 1948, Mr. Baldwin has handled a variety of appointments in both technical and sales work.

G-E TO MANUFACTURE NEW MAGNET MATERIAL

The Carboloy Department of General Electric Company has been licensed by Philips Laboratories, Inc., to manufacture a new magnet material composed essentially of barium-oxide-iron oxide.

Carboloy officials stated that no material will be available during 1953, but a research program will be conducted to further develop the new magnetic material which has properties approaching those of alnico. Chief advantage is the lack of strategic materials in its composition.

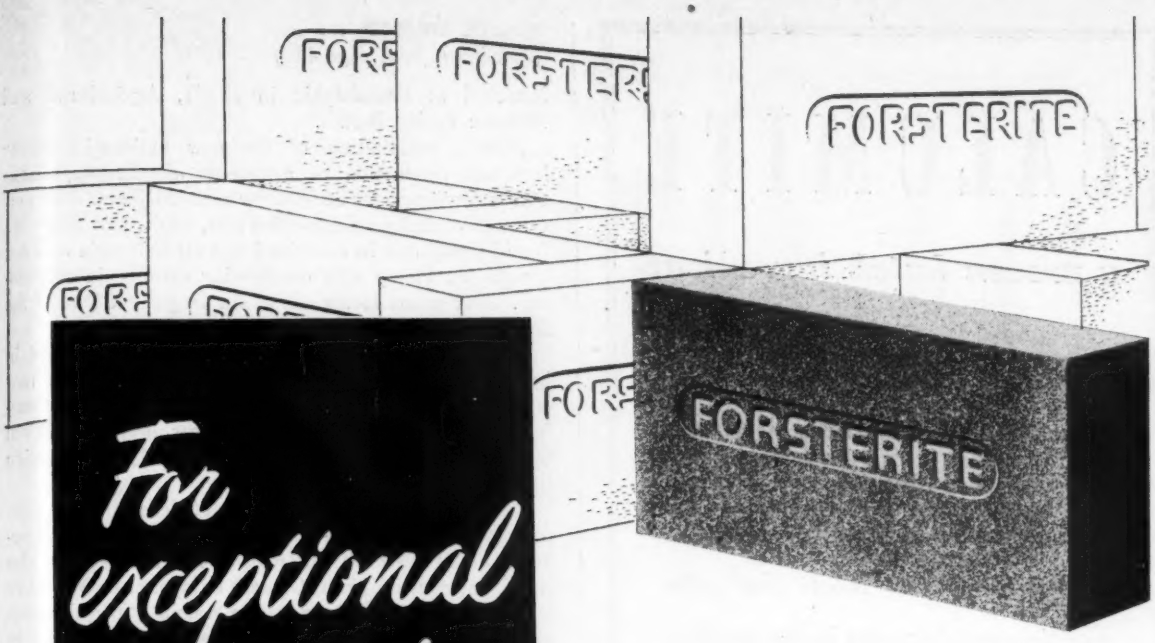
Possible applications for the new material are in the TV and radio field, dynamos, and motors.

CHAIRMAN AND DATES OF NATIONAL CHEMICAL SHOW ANNOUNCED

Dr. T. U. Marron, chemical research supervisor for the A. B. Dick Company, has been named Chairman of the Eighth National Chemical Exposition by the Chicago Section of the American Chemical Society.

Dates for the next Exposition have been announced as October 12 through 15, and it will be held in the Chicago Coliseum.

• Alsynite Company of America has announced the appointment of Donald Colburn as sales representative to serve Southern California and Arizona. Mr. Colburn will function as District Manager in this area.



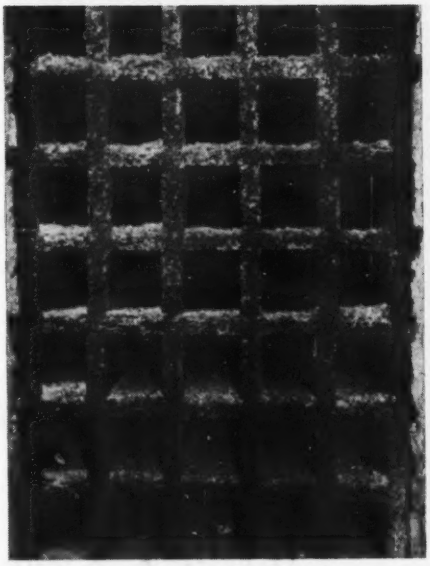
For exceptional service

in glass furnace regenerators

HARBISON-WALKER FORSTERITE REFRACTORIES

A service life of several years, while exceptional with most checker brick, is not uncommon with Harbison-Walker FORSTERITE. This hard burned magnesium-silicate refractory is extremely resistant to wetting and slagging at high temperatures.

Forsterite checkers used in full height air-chamber settings remain clean, dry and highly efficient, because they withstand fluxing by volatile alkalies and batch carry-over without wetting, glazing or clogging. In regenerator side walls, arches and in port walls and crowns Forsterite refractories are also used with excellent results.



The clean condition of this glass furnace regenerator checker setting of Harbison-Walker Forsterite brick after 18 months of continuous service is typical of many installations.

HARBISON-WALKER

REFRACTORIES COMPANY ***and Subsidiaries***

GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

WORLD'S LARGEST PRODUCER OF REFRACTORIES

CALUMITE

a proven batch ingredient

Not since the first glass manufacturer tried it has there been any question as to the value of Calumite. Today it is an established glassmaking material that meets the most exacting requirements in the production of colored glasses.

Manufacturers of amber and other colored glassware demand Calumite because it offers: *a low-cost source of alumina, easier melting, uniformity, better glass quality, and positive control over quality since it affords a method of mathematical approach to glassmaking.*

Calumite will increase your profits in two ways — it helps increase sales through better quality of ware and it lowers production costs.

Write for details now.

The Calumite Co.
HAMILTON, OHIO

FLASK DESIGN . . .
(*Continued from page* 426)

launched at Philadelphia in 1815), Agricultural and Masonic Pocket Bottles."

Dyott's exploitation of the new nationalist fervor launched production of a torrent of historical flasks which continued for at least the next 30 years. The new symobls of independence—the star, eagle, and flag—are found singly and in combination with Columbia and her companion Plenty with overflowing cornucopia of produce. This group forms one of the largest sections of the flask display.

Agriculture and free trade also find their places in bottle decoration with special emphasis given the new economic independence. The steam locomotive and steamboat excited the imagination of glass designers. Even the politically controversial tariff found its expression in glass.

One of the most popular forms of decoration was the portrayal of national heroes. Washington's likeness appears on at least 60 different flasks; tribute was also paid Benjamin Franklin, General Lafayette, DeWitt Clinton, Thomas Jefferson, and John Adams. Special recognition went to Major Samuel Ringgold, immortalized in glass by his Baltimore followers.

Two foreigners attracted sufficient interest to warrant whiskey flask tribute. Portraits of Jenny Lind, the Swedish Nightingale, were produced in almost every conceivable form and medium and it is not surprising to find her likeness on "likker" bottles. And Louis Kossuth, the temperamental Hungarian patriot who came to this country seeking aid against Russian aggression, was furthered in his cause by the reproduction of his portrait on the sides of bottles.

In view of the wide popularity of the decorative flasks, it was inevitable that politicians of the day should capitalize on this new promotional medium. Liquor had long been a vote persuader and campaigners were quick to recognize the appeal of the earthy medium. Campaigns were carried to bottles by John Quincy Adams, Andrew Jackson, Henry Clay, William Henry Harrison, and Zachary Taylor.

And finally, a special group of flasks appeared which can be attributed to the progressive opportunism of American businessmen. Rumor of Colorado gold discoveries late in 1858 fired the imagination of a population hard hit by depression and thousands streamed West in search of an Eldorado. Bottle manufacturers turned the rush to their own advantage with a flask "For Pike's Peak" advising the use of spirits "for preventing fever and ague" and "correcting the evils consequent on a change of water."

The exhibition has been cataloged meticulously by Miss McKearin and the resulting publication contains 93 line cuts and four halftones of special features. The catalog is of special interest to the glass collector for its publication of recent research into glass of the 1820-50 era. Historically the booklet gives an interesting sidelight of the period. Copies may be obtained for fifty cents by addressing the Director, The Corning Museum of Glass, Corning Glass Center, Corning, N. Y.

First opened to the public on June 15, the exhibition of "American Historical Flasks" will remain on display until September 15 at The Corning Museum of Glass.

brighten up your sales picture with
GLASS COLORS applied over

SATIN-ETCH

frost

Brilliant, opaque colors over a background of smooth, misty Satin-Etch . . . a combination that tells the sales message FAST.

Pemco's TR colors are especially formulated for cosmetic containers. They have a high degree of sulfide resistance so that they will not discolor by contact with chemicals or cartons.

Satin-Etch is sulfide resistant too. Use BOTH for better designs, newer effects, greater sales appeal. Write for samples, giving the firing conditions in your lehrs.

WORLD'S FINEST PEMCO

APPLIED GLASS COLOR DIVISION

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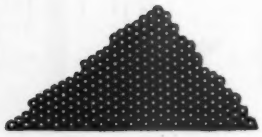

Uniform particle size is one of the outstanding qualities of Gold Bond glasshouse lime and limestone products. Only National Gypsum can supply *all* of these products—Gold Bond High Calcium and Dolomitic Limestone, Gold Bond Dolomite Fluxing Lime and Hydrates, Gold Bond Low-Iron Calcium Carbonate, also pottery and casting plasters.

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AMCO

Design, Erection and Operation of Manufacturing Plants and Furnaces for All Types of GLASS WARE

AMSLER MORTON CORPORATION
CHAMBER OF COMMERCE BUILDING, PITTSBURGH 19, PA.

CHEMIST LOOKS AT GLASS . . .

(*Continued from page* 429)

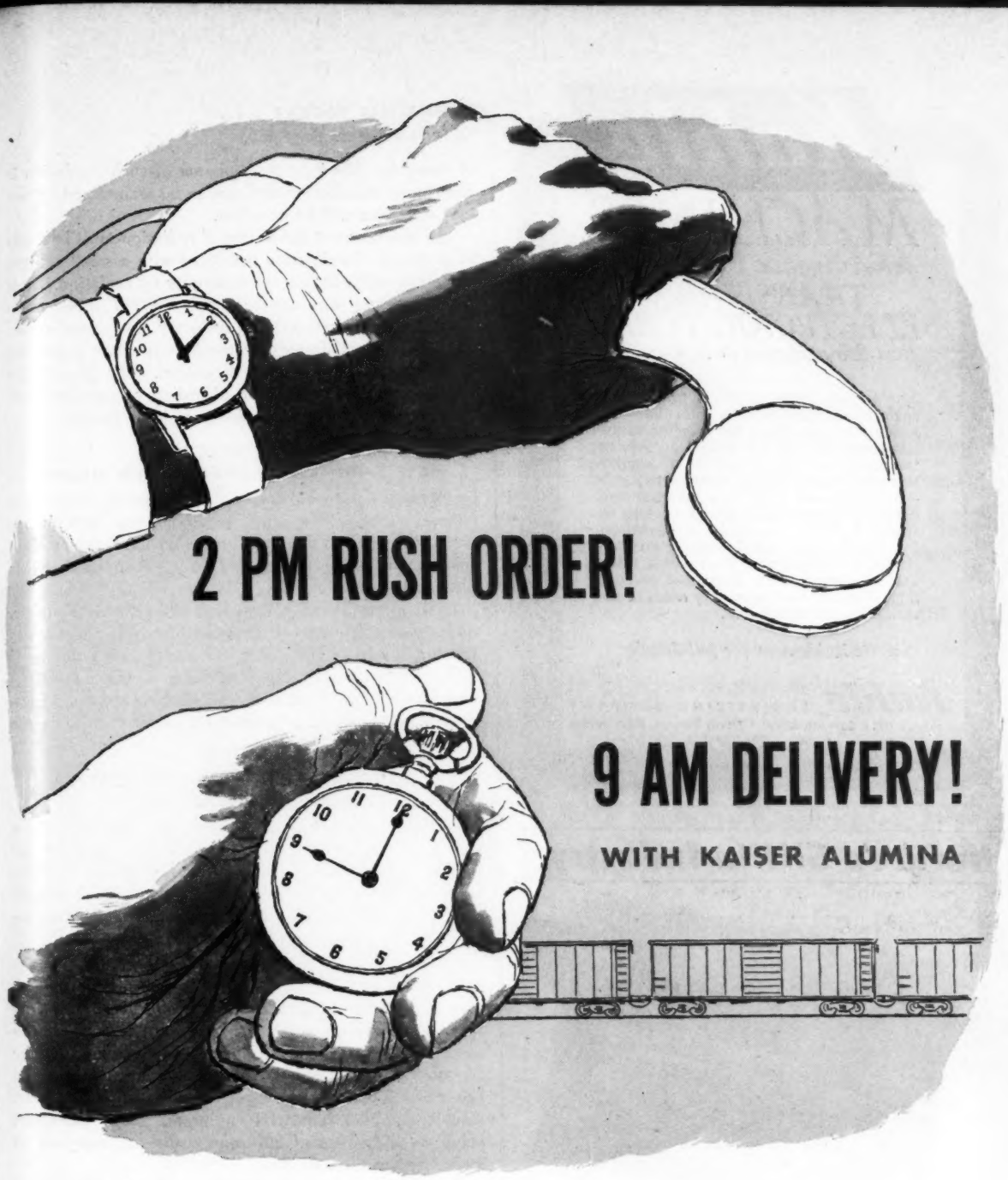
and other metals, as well as boron, can replace silicon in the glass lattice. Elements once found objectionable are deliberately introduced into glass; witness titanium.

One reaction of the fifty-year period is startling, although it should have been expected by any of us who had studied colloids in glass. The so-called photosensitive effect, though not then produced through masks or negatives, is an old one. We encountered it in the striking of copper, gold, and silver glasses. We saw it in glass which had been exposed to solar radiation on the desert, or to arc-light. The scientific study of light-frequency and temperature effects on these glasses and on opal-yielding crystal glasses is further evidence of the value of research. The selective solubility of the last named is startling. An equally impressive procedure of the 1902-1952 period is the acid-leaching of borosilicate glass to produce high-silica massive objects and fibers. The quartz fiber was almost a curio in the writer's student days. The production of these fibers from acid-leached borosilicate fibers now constitutes an industry. The gigantic fiber glass industry, with other varied types, is obvious to every student of glass. And foam glass, applying the Boyle's Law and Charles' Law gas effects to molten glass, is also common today.

We use minerals and chemicals that were not introduced into the batch at the turn of the century. Feldspar has been replaced wholly, or in part, by nepheline syenite, aplite, kyanite, lepidolite, and other silicate minerals. Lithium has been substituted for sodium and potassium in special glasses. Aluminum and boron have replaced silicon in considerable proportions. Zinc oxide takes a common place with lime and litharge. Phosphates, formerly avoided except in certain opal glasses, now constitute an important series of glasses. Barium compounds are in more common use. Borax is a part of most batches. Salt is a common melt-stirrer. Cerium, neodymium, and selenium are decolorizers. Arsenic has been blamed for solarization, and antimony has replaced it. Fluorine stays in the glass appreciably instead of escaping entirely as SiF_4 as formerly assumed. Water plays a part even at furnace temperatures. Magnesium produces various expansion effects depending on concentration. Manganese and other metal-ion colors vary with temperature and accompanying electron gains or losses. Neodymium and chromium have produced dichoric glasses. Zirconia has yielded desirable opal glass.

There have been interesting studies on the diffusion of metals, gases, and metal ions through glasses. Glasses have been formed from vapors and vapors have been applied to glasses. Synthetic rubies and sapphires and special jewel-bearing glasses have been developed in America. Silicone applications protect the glass surface and silicon-plastics yield better laminates because of the tetrahedral silicon-oxygen linkage in both. Last, but by no means least, many phase equilibrium studies have been made and published. These are extremely valuable.

And so, your chemist, perhaps a sort of pioneer in the glass field in 1902, has given you his perspective of the period 1902-1952, largely from memory. It is not complete, but perhaps it will indicate to younger scientists the advantages they possess that were not available early in the twentieth century.



A manufacturer was faced with a costly plant shutdown not long ago because of a low inventory of alumina. One phone call to Kaiser Chemicals at 2 P.M. solved his problem—at 9 A.M. the following morning the required alumina was at his plant siding.

While this 19-hour service is not always required, it illustrates that, with Kaiser Chemicals, orders get *immediate, individual* attention, cutting delivery time, making large, costly inventories unnecessary.

This personal service—combined with unsurpassed quality and experienced technical assistance—has made Kaiser Chemicals a major supplier of calcined and hydrated aluminas. Operating one of the largest alumina plants in the country, we supply alumina to more than eighty per cent of the nation's users.

Whether you manufacture abrasives, glass, ceramics, refractories, catalysts, or chemicals for water treatment, we have the product and the service to meet your needs exactly. Contact principal sales offices: *Chemical Division,* Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California; First National Tower, Akron 8, Ohio.

Kaiser Chemicals

calcined and hydrated aluminas

Alumina • Basic Refractory Bricks and Ramming Materials • Dolomite
Magnesia • Magnesite • Periclase

Kahle
MACHINES
for Automatic Production of
TRANSISTORS
ELECTRONIC TUBES
from Sub-miniature to Cathode Ray

More than forty years of precision-engineering experience is built into the Kahle machines which are supplied to the electronics industry for general purpose or for special purpose. Hundreds of production problems have been presented to Kahle — in every case Kahle has designed and developed a machine to produce results as specified. Kahle specializes in equipment for manufacturing subminiature, miniature, standard, cathode ray, transmitting tubes and transistors .. and other glass parts in limited quantity for laboratory needs or for maximum production runs.

Write Kahle now for full details

Kahle ENGINEERING COMPANY
1314 Seventh Street • North Bergen, New Jersey

"KAHLE"—"for built-in know-how"

Nature's Gift to Industry

Powdered Silica of the highest Quality results from grinding these pure Ottawa and Rockwood sands.

• The Silica Sands of Ottawa and Rockwood, purified by nature's processing over untold ages . . . mined, cleansed and graded by special refining at our plants, offers glass-makers Silica Sands of supreme quality.

RESEARCH DIGEST . . .
(*Continued from page* 435)

of concrete. The light transmission of such a solution is completely satisfactory and can so be maintained by use of a stabilizer and by filtration.

The glass nearest the source of radiation must be made of a special formulation stabilized with a small amount of cerium oxide to prevent darkening by radiation. Such special glasses are approximately 10,000 times more resistant in this respect than ordinary glasses and essentially retain satisfactory transmissivity after exposures of as much as 10 million Roentgen. The glass plane nearest the observer may be of ordinary composition so long as it is stable toward zinc bromide solution.

NEW L-O-F LAMINATED FIBER GLASS

Laminating equipment to produce a general line of aluminum, paper, plastic, synthetic rubber, and cloth facings for superfine fiber glass for insulation has been put into operation at Libbey-Owens-Ford Glass Company's Fiber Glass Division.

J. M. Johns, Division President and General Manager, said the first shipment of the newly faced fiber glass was an aluminum foil lamination for use in lining the metal jacket of warm air furnaces. The aluminum reflects back the infrared rays of heat and the fiber glass insulates against loss of heat and reduces any noise in the unit.

WESTINGHOUSE CANCELS PLANS FOR SEALED-BEAM PLANT

The Westinghouse Electric Corporation will not build a new sealed-beam lamp plant, originally scheduled for Madison, Indiana. Increased manufacturing facilities at the Fairmount, West Virginia, plant, plus improved design of manufacturing equipment have made the construction of a new plant unnecessary.

MANAGEMENT CLINIC ANNOUNCED

The Seventeenth Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society will be held November 4, 5, and 6 at the Sheraton Hotel, Chicago. According to the General Chairman Ralph H. Landes, Western Electric Company, more than 2000 industrial engineers, works managers, plant superintendents, and supervisors are expected to attend the technical sessions.

Topflight industrial leaders from all over the United States will discuss the latest developments in the field of time study, motion economy, job evaluation, methods, plant layout, materials handling, and human relations.

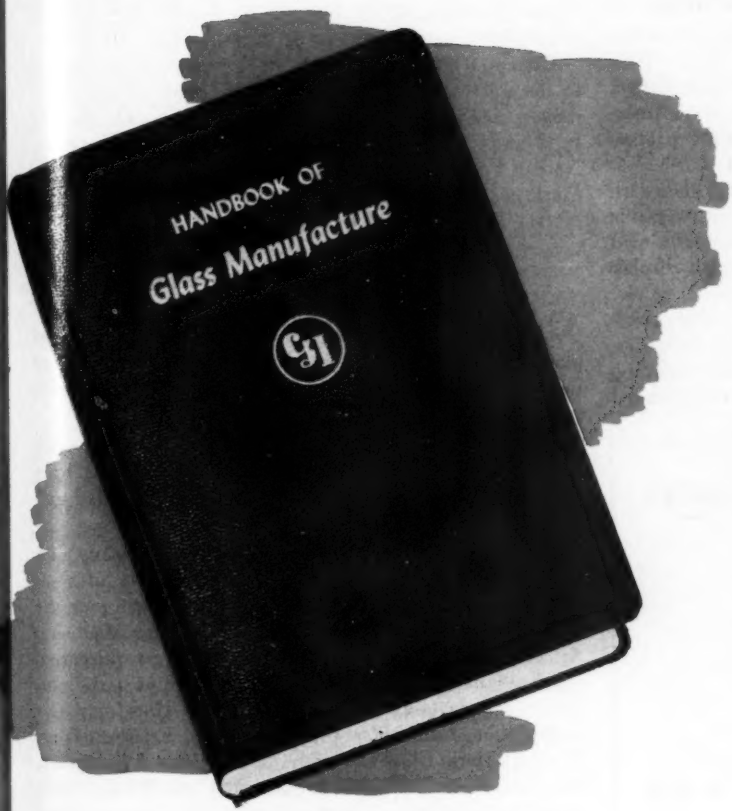
GAMA INDUSTRIAL CODE SEAL

Thirty-three manufacturers of industrial gas equipment have been authorized to use a new "signer seal" trademark, signifying conformance with the Code of Ethics recently adopted by the Gas Appliance Manufacturers Association's industrial division.

F. C. Schaefer, Chairman of the GAMA division, reported that the seal may be used on all of the more than 25,000 different varieties of gas equipment in American industry to signify conformance with the "highest standards of safety, performance, and durability."

It's *new*

and it's *different*



IT'S NEW because twelve years have passed since the first handbook for glass manufacturers was published and so much has taken place in the intervening years in technological and engineering development.

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NEW OFFICERS ELECTED BY CAMBRIDGE WIRE CLOTH

The Cambridge Wire Cloth Company has announced the following new officers recently elected by the Board of Directors: Chairman of the Board and Chief Executive Officer, Clarence E. Pink; President, Edward N. Evans; Senior Vice President, Irwin F. Pink; Executive Vice President, Fred L. Hooper; Secretary, Harold E. Pink; Treasurer, Nina E. Pink.

Clarence E. Pink has been President of the company since 1937, when he succeeded his father, the late Edward F. Pink. From 1920 to 1937, Mr. Pink had been Secretary and Treasurer, and General Sales Manager.

AMERICAN GLASSWARE JUBILEE PROMOTION FEATURED IN BROCHURE

A brochure illustrating all the material available to the thousands of retailers who will participate in the 1953 American Glassware Jubilee is now being distributed, according to officials of the Glassware Institute of America, whose member companies are sponsoring this promotion for the third consecutive year.

The event is designed to make the public glassware conscious and to remind them that good glassware is available at moderate prices, and the promotion is aimed at the week of October 5 through 10, although display material is undated and usable on later dates.

The brochure features reproductions of eight glamorous table settings which use items especially chosen by leading manufacturers of table, kitchen, and cooking glassware for display during the Jubilee. Also included are giant blow-ups of these photographs for display, banners, streamers, various types of advertising suggestions and material, all featuring the "Glassware for Gracious Living" slogan, which will again be the Jubilee's theme.

DRAKENFELD HONORS VETERAN EMPLOYEES

Ten men and women have compiled a total of 278 years' service with B. F. Drakenfield & Co., Inc., it has been announced. They are senior employees among a group of 44 Drakenfield veterans whose years of service total 881. All of these veteran employees were honored at the company's fourth annual family picnic in Washington Park recently. High point of the day was the presentation of jeweled service pins to 10, 15, 20, and 25-year employees.

Diamond pins, for 25-year employees, were presented to the following: Harold Brenner, 29 years; Hazel Henderson, 28 years; Martha Kelley, 25 years; Dr. Robert R. Shively, Vice President of the company, 31 years; Nathan Porter, 30 years; Harry Fulton, 26 years; Gibson Clark, 31 years; Victor Remington, 25 years; Arthur Norris, 27 years; and Henry McManus, 26 years.

CONTEMPORARY OHIO GLASS ON DISPLAY

Over 200 pieces of contemporary Ohio glass have been placed on display in the Ohio State Museum in Columbus in an exhibit sponsored by ten Ohio glass manufacturers celebrating Ohio's sesquicentennial birthday.

The items range in size from a tiny decorated one-ounce beverage container to a twenty-three-pound television bulb and include a complete assortment of fine decorated and cut crystal tableware, buffet, and salon pieces.

The purpose of the display is to acquaint Ohioans with the State's glass industry and the wide variety of glass products made in Ohio. The exhibit, which will tour the State for a month, was arranged by J. Arthur MacLean, Art and Cultural Coordinator of the Ohio Sesquicentennial headquarters committee. Glass companies participating in the traveling exhibit are: Anchor Hocking Glass Corporation, Cambridge Glass Company, Erickson Glass Works, Federal Glass Company, A. H. Heisey & Company, Imperial Glass Corporation, Kemple Glass Works, Lancaster Lens Company, Owens-Illinois Glass Company, and United States Glass Company.

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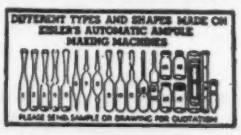

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HELP WANTED

PRODUCTION SUPERVISOR for Press House. Mold experience would be helpful. Job has good future possibilities. Send full details on experience and references. Your reply will be held confidential. Reply Box 135, c/o The Glass Industry, 55 West 42nd Street, New York 36, N. Y.

YOUNG MAN with engineering or glass technology background for quality control work in glass containers. Reply in complete detail to Box 136, c/o The Glass Industry, 55 West 42nd St., New York 36, N. Y.

CURRENT STATISTICS . . .

(*Continued from page* 436)

10,704,873 dozens, or 1.1 per cent more than the 10,581,964 dozens on hand at the end of April. Stocks at the end of May 1952 were 9,073,280 dozens.

Production of automatic tumblers during June 1953 dropped 12.4 per cent to reach 5,296,383 dozens. Production during June 1952 was 4,830,500 dozens. Shipments also fell during June and were reported to be 4,800,045 dozens. This is a drop of 19.3 per cent from May shipments. During June 1952, shipments were 5,490,876 dozens. Stocks on hand at the end of June 1953 were 11,088,567 dozens. This is 3.5 per cent higher than for May. Stocks on hand at the end of June 1952 were 8,349,353 dozens.

Table, kitchen, and household glassware: Manufacturers' sales of machine-made table, kitchen, and household glassware fell off .4 per cent during May to reach 3,532,555 dozens. This is a drop from the 3,549,110 dozens sold during April. Sales during May 1952 were 3,504,440 dozens. At the close of the 12-month period ending May 1953, manufacturers had sold a total of 41,906,412 dozens, which is 8.7 per cent above the 38,550,186 dozens sold during the corresponding period in 1952.

Manufacturers' sales of machine-made table, kitchen, and household glassware during June 1953 were 2,740,816 dozens, a drop of 22.4 per cent from May. Sales during June 1952 were 2,907,521 dozens. At the close of the 12-month period ending June 1953, manufacturers had sold a total of 41,739,707 dozens. This is 7.6 per cent higher than the 38,775,475 dozens sold during the corresponding period ending June 1952.

MEYERCORD DECALCOMANIAS WIN AWARD

For the second straight year, The Meyercord Company has won first place in the Annual Awards Competition of the Lithographic National Association, Inc.

The awards are made to encourage outstanding merit and distinction in production of lithographic decalcomanias.

• Fisher Scientific Company has opened a New England office at 10 Brattle Street, Cambridge, Mass. Heading the office are Russell Bennett and Miss Norma Musto.

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